AUG 23 1897
368459
SMITHSONIAN DEPOS

THE AMERICAN
GAS LIGHT JOURNAL
REDMANKENNY, N.Y.
PUBLISHING OFFICE No. 32 PINE STREET

DEVOTED TO THE INTERESTS OF ILLUMINATION, HEATING, MECHANICAL, CHEMICAL AND GENERAL SCIENCE.

VOLUME LXVII. No. 8 Whole No. 1,159. | NEW YORK, MONDAY, AUGUST 23, 1897. | $3 PER ANNUM, IN ADVANCE.

A. M. CALLENDER & CO., Proprietors. C. E. SANDERSON, Manager.
THOMAS J. CUNNINGHAM and ELBERT P. CALLENDER, Editors.

ENTERED AT THE POST OFFICE AT NEW YORK, N. Y., AS SECOND-CLASS MATTER.

Published on each Monday of the year, at No. 32 Pine Street, New York.

Collections are invariably made directly from this office for subscriptions, advertisements, etc. We have agents to solicit the same, but they are not authorized to receipt for money.

Terms of Subscription, Including Postage—For the United States and Canada, $3 per annum. European countries, $4.5) (19 shillings—22½ francs). All payments to be made in advance. Single copies, 10 cents.

Correspondence.—Wishing to make this JOURNAL a gazette of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, correspondence is solicited for publication from all who make the study of those subjects a pleasure or a profession.

The American News Company, Nos. 39 and 41 Chambers street, New York, are agents for this JOURNAL. Newsdealers will send orders to them.

The Public Lighting Tables of the American Meter Company will be found in the page advertisement of that Company.

CONTENTS.

An Asterisk (*) denotes an illustrated article.

EDITORIALS—
Briefly Told 281
Mr. Miller on "Uniformity of Gas Accounts"—Mr. Quilty's Paper on "Municipal Control"—Notes.
The Mechanical Stacking of Coke 282
Fifth Annual Meeting, Pacific Coast Gas Association—Official Report—Revised by the Secretary—Continued from page 251..... 282
First Day, Afternoon Session—Practical Suggestions, by Mr. C. E. Burrows—Discussion—The Uniformity of Gas Accounts, by Mr. C. O. G. Miller—Discussion—An Invitation—Municipal Control, by Mr. C. W. Quilty—Discussion—A Short History of a Long Life, by Mr. C. M. Converse—Discussion—Recuperator Benches for Coke and Coal Firing, by Mr. D. R. Russell—Discussion.
Prepayment Meters, by Mr. Thos. Wilson..... 292
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 293
Contract for the Messrs. Riter & Conley—Mr. A. E. Hammond Resigns—Death of Mr. James Simmons—Minute to Memory of Mr. Simmons—Welsbach Street Lights, Mathuen, Mass.—Annual Report, Supt Public Lamps, Washington, D. C.—Report of Gas and Meters Inspector, D. C.—Change in Corporate Title, Rockville, Conn.—Welsbach Public Lighting, Grand Rapids, Mich.—Pintsch Plant at Mobile, Ala.—Asking for Cheaper Gas Rates, Montclair, N. J.—Lightning and Gas Pipes—Sale of the Middletown (O.) Plant—Damage Award Settlement—Annual Report, Ottawa, Ills.—And Other Items.
Improved Carbons and the Manufacturers' Opportunity..... 295
The Market for Gas Securities..... 295

BRIEFLY TOLD.

MR. MILLER ON "UNIFORMITY OF GAS ACCOUNTS."—This issue of the JOURNAL is largely given over to a report of the proceedings of the July last, or fifth meeting of the Pacific Coast Gas Association, and we believe that our readers will not have cause for other than satisfaction that our columns are so occupied. The current chapters contain several papers, one of which was prepared by Mr. C. O. G. Miller, of San Francisco, who, at the instance of Secretary Britton, was persuaded by that clever "insister" to "get together" some lines on the topic of "Uniformity of Gas Accounts." The fact that Mr. Miller appreciated the weight of the task set out by the Secretary is shown by Mr. Miller's opening paragraphs; for while Secretary Britton "thought it would not take over one hour or two" of Mr. Miller's time to write a paper on "Uniformity of Gas Accounts," the author assured the Association that the paper took up very much more of his time than an hour or two, which we all can very well believe. Papers are written, not made; and if a paper is to be either readable or valuable its framing must have been preceded by study. There can be no doubt about it that Mr. Miller spared neither study nor time in preparing and setting forth the results of his examining and experience, for the veriest tyro could, out of that which the author spreads before us, frame a general set of accounts that would keep the moving affairs of any gas company—large or small—in quickly readable order. The trouble, however, is that bookkeepers, unlike books and papers, are made, out of the training that made them, and according as their training was so shall the statement of their accounts be—understandable to them, as a rule; frequently misunderstandable to anyone else. So we take it that, while bookkeepers keep accounts, even giving the figuring and accounting men the starting point of any hard fast set of rules, the accounts will vary, as to form and setting forth, just as the personal factor in the history of each writer of them has been developed. In other words, we fear that, difficult as it was for Mr. Miller to arrange for his plea for "uniformity," more difficult still will it be to outline, and put and keep in practice, an accounting system for the operations of any company, even admitting that such company is in the line of trade with hundreds of others, that would partially harmonize with the practices of its contemporaries. Mr. Miller, however, has put forth a system of accounting that should be regarded as cogent, readable and well worth adopting.

MR. QUILTY'S PAPER ON "MUNICIPAL CONTROL."—Another paper before the Coast Association, given in this issue, is that by Mr. C. W. Quilty, of San Jose, who dealt with the very much in evidence theme of municipal oppression of citizen ownership. That, of course, was not the real title of Mr. Quilty's compilation, for he dealt with the matter of municipal control as intertwined with the matter of municipal ownership; but it would nevertheless well indicate the nature of his argument, which, while smartly resenting the first innovation, sensibly concurred in the fair administering of the other governing privilege. If it is admitted that the privileges given an ordinary company that deals with the public—such as railroads, water supply, electric and gas lighting companies—to operate in the streets are not commensurate in a public sense with the services that such company renders the public in the supplying to them of its wares, then let the purveyors be restricted in any fair sense, through direct taxation, that necessarily implies protection; but not through or by taxation, direct or indirect, which means confiscation—and, certainly, an ordinance, for instance, that compels a gas or other lighting company to cut its rates beneath the living point, is the object of direct taxation which amounts to confiscation. To this point it looks that we are near, for the gas industry (notably in evidence is the recently enacted ordinance at Indianapolis obliging the Company in that city to sell its product at 75 cents per 1,000 cubic feet) has, rather more than any other contemporaneous industry, been smitten by the taxing hand

for the "smiter" has always received his pay, and the "smiter" seems to think that his pay should increase as the business of the "smitten" develops." The—for such he is—blackmailer, though, forgets that, when he received his earlier *quid pro quo*, a stipulation, in addition to his "bit," was that the gas user should be served at a rate rather lower than the one in vogue, the consumers' share has been reduced to the point where the blackmailer has nothing to offer for "protecting" the blackmailed. In other words, the concessions made to the consumers have been such, in respect of gas supply at least, that the industry can no longer complacently hearken and respond to a suggestion that official interference may be partly stayed through the payment of a certain sum, to influence legislation or otherwise. We in America, above those in all other countries, where merit is presumed to easily advance its possessor, so far as the gas industry is concerned, might do well to take a lesson from the leaves of England's treatment of gas supply. There gas properties were taken over for operation on public account only when it was shown that the private owners of such enterprises were indifferent to the demands made upon them for service by their current and prospective consumers; moreover, such acquisitions were only finally completed through paying the indifferent owners that which their property was really worth—that worth to include the value of *the right* under which the company had worked. The JOURNAL abates not in the slightest its firm thought that the United States forms the sturdiest and strongest nation the world over, but it would reprehend and it does reprehend the idea that its very strength should be the excuse for excess. Very many of these lines are well apart from Mr. Quilty's even-tempered argument, but as his story prompted them, it is only for us now to say, the perfect service between corporations public and corporations private can best and only be attained by municipal control, rather than by municipal oppression or municipal ownership; for, of the three, the last would be the worst for the consumer.

NOTES.—Mr. Charles M. Higgins sailed for Europe, per steamship Paris, on the morning of the 18th inst. His stay abroad is indefinite, but he hopes to return in time to share the American Association's convention at Old Point Comfort, next October.——Mr. John S. Rittenhouse, in the early 80's a prominent member of the Board of Gas Trustees, Philadelphia, Pa., died at his home in Germantown, Pa., on the morning of August 14th. He was in his 67th year.——We understand that the authorities of East Liverpool, O., have granted a franchise for the operation of a gas plant at that point to the J. W. McClurg Company, of Pittsburgh, Pa.——The proprietors of the Bridgeport (Conn.) Gas Light Company have awarded contracts for a large addition to the generating capacity of the plant. We understand that considerable addition will also be made to the storage capacity. The work is to be finished by December 1st.——Calistoga, Cal., wants a gas works, and it looks that Mr. A. T. Badlam might supply the outfit.——The proprietors of the Mankato (Minn.) Gas and Electric Company are preparing a new scale of rates, that will show a round concession to the gas consumers of Mankato.——Mr. W. R. Blackman has been deposed from the position of Secretary and Treasurer to the Los Angeles Electric Company. There was something wrong in his accounts.

The Mechanical Stacking of Coke.

The London *Journal* "notes" that reference has on several occasions been made to the system devised by Mr. de Brouwer, of Bruges, for the mechanical quenching and removal of coke from the retort house. It may be remembered that the hot coke, on being drawn from the retorts, falls into a water-tight channel, and is conveyed away by an arrangement of endless chains and cross bars carried by wheels. Outside the house, the channel rises at an angle of about 30°; but it can be raised to any height, and continued in any direction.

It seems, from a short communication made by M. Rouget to the Société Technique du Gaz en France at their last meeting, that the Company who are working M. de Brouwer's patent in France have somewhat extended his idea at the Fontainebleau Gas Works by prolonging the channel so that the coke is conveyed up a gradient of 25° to a height of 13 feet, and then falls into a long horizontal channel, at the end of which is the coke breaker, where it arrives without having been touched from the time of leaving the retorts. If it is desired simply to stack the coke, the conveyers at the bottom of the channel can be so regulated that the lumps always fall on the top of the heap already formed, so that there will be a drop of only about 3 feet. This is an important point, as with the greater fall there would necessarily be a larger production of breeze.

[OFFICIAL REPORT.—REVISED BY THE SECRETARY.—CONTINUED FROM PAGE 251.]

FIFTH ANNUAL MEETING, PACIFIC COAST GAS ASSOCIATION.

HELD AT SAN FRANCISCO, CAL., JULY 20, 21 AND 22, 1897.

FIRST DAY—AFTERNOON SESSION.

The President announced that the paper on

PRACTICAL SUGGESTIONS,

by Mr. C. E. Burrows, of Walla Walla, Wash., would be read by the Secretary. Secretary Britton read as follows:

Having been requested by our worthy President to "write a paper," the subject given me being to discuss "The Practical Side from a Mechanical Standpoint of the Manipulation of the Manufacturing End and Maintenance of a Modern Gas Works of Medium Proportions," my good mentor then proceeds to enumerate the various subdivisions of the subject. If I were capable of following up his instructions and producing a paper accordingly, your patience would be exhausted in the reading.

Until we build our works we will have nothing to manipulate, consequently we will look over in a general way the matter of construction. That a plant is to be small or medium in capacity would be no excuse for making it in any respect inferior, either in arrangement, material or workmanship. There may be places where the "rule of thumb" may work all right; but such are not to be found about a gas plant of any proportions.

Commencing with the housing, ample room should be provided that all the apparatus may be under cover. Brick and iron will do for the houses, if properly placed. Fire risks should be carried by the gas company, and the premium paid in advance once for all.

Don't cramp the retort house. A stack of benches should be accessible from every side, and 16 feet in front of a bench is as little as good practice will allow. Good height of walls and a roof well ventilated will add to the comfort of the stokers. I abominate the practice, so common, of venting bench flues under the roof. A chimney should pass through the roof for each flue.

Retorts.—I suppose iron retorts are no longer used in any coal gas works. My practice as well as preference for settings of clay leans toward what I think is called the open setting—*i. e.*, using the least amount of material in the oven that will properly sustain and protect the retorts. The expense (life) of retorts depends very largely on the manner of handling. In the higher latitudes it is necessary to let down part of your benches every spring and relight them in the fall About three years of this variable work will generally finish a setting. With continuous work I have known a bench to last seven years.

I have found it advantageous to use a scraper (made about the shape of retort) thoroughly, every three or four charges, thus keeping down to some extent the deposit of carbon; by such attention we may run about a year with one scurfing. The throats of standpipes are thoroughly cleaned every charge, using for that purpose a disk of sheet steel, nearly as large as the opening in the pipe. With this care I have never had a stopped standpipe. The outside of retorts requires some attention, for if you have to force the heat through a few inches of ash deposit, the result is more fuel and more damage to the furnace walls.

Furnace.—I have found that, for a bench of five retorts, a firebox of 12 inches by 4 feet was sufficiently large; and, for two or three retorts, the same breadth, by 3 feet, is ample. I have had no experience with regenerative, half-depth, or other patent heating appliances, and, therefore, am not competent to speak of them, but am impressed with the notion that, with an output of 25,000 feet or less per day, their introduction would not pay.

Properly placed dampers, for the regulation of the furnace draft and to close while cleaning fires, are among the first requisites. I have heard it said that dividends were made, if made at all, in the retort house; certainly, if there is lack of system, and a general appearance of untidiness in the retort house, we would look for loss to follow. With the best of men a careful manager will look closely after the place of beginning.

When about to let down a bench that is to be relighted, the retorts should be freed from all carbon deposit, and, after the final firing, every crevice that would admit air should be carefully closed. With these precautions we will have but little trouble from cracked retorts. With properly constructed settings the maintenance of high and uniform heats is not difficult, but vigilance is needed to prevent choked flues and heavily coated retorts, which make for low heats and small yields.

For convenience and accuracy in charging retorts we have steel lined barrows, and weigh the charge for each retort separately; and, as to size of charge, are governed principally by the amount of gas required to be made in a given time, and by the heats. The heat we endeavor to carry will carbonize 200 pounds in four hours (retorts being 12 ins. x 20 ins. x 9 feet), but charges vary from 150 pounds to 250 pounds, the effort being to have the retorts working constantly. Charges are drawn into iron barrows and run to one side, till the new charge is shoveled into the retorts and the lids closed.

In the absence of instruments by which to measure the temperature the eye and the results are the only guides we have, and I believe the latter are the more reliable. By using one grade of coal for a considerable time, we learn what results to look for, and are not likely to go far wrong.

The care of gasholder is oft times a matter of serious concern. To keep the holder in good condition at least once a year it should have a good painting, after all rust spots are cleansed and all scales removed. To prevent formation of ice we pass all the water supplied to the tank through a reservoir, elevated in the retort house, which in winter is heated by steam.

The only exhauster I have manipulated is the Connelly steam jet, placed next the hydraulic. Its use seemed to add something to the yield of the coal, and possibly would have added to the life of the retorts if it had been continued. I became convinced that naphthaline was being deposited as a result of the steam jet, and was quite willing to forego the advantages.

Passing from the retort house, we come to the condensers which, to my mind, are not so much a matter of kind as capacity. A series of pipes so arranged as to allow the gas to divide into several streams, and so travel slowly along its course, are very efficient for small works.

I would do away with scrubbers as such, making the washer all that is required between the condenser and purifiers. The latter should be large. I would rather have two boxes 4 by 8 feet, than four boxes 4 by 4½, which was, and perhaps is yet, a very common size. Here again is a place requiring close attention, for the man is apt to put the material in the boxes in too dry condition, in which case we lose half the efficiency.

Of distribution, I would say, first, that it is a mistake to lay small mains. Calculating the size of pipe required to give a certain amount of gas at desired pressure, I would add a liberal percentage to such size. It is very annoying to find that half a mile from the works you can't get more than 5-10ths pressure, when you have 23 or 25-10ths at the plant. I have had such experience and know what it means, especially in the way of unaccounted-for gas. Works situated far inland, and off water ways, are debarred from the use of cast iron mains, by the high cost of freight; hence wrought iron pipe is generally used, and boiler tube is not uncommon. With the latter I have had fairly good success, by laying in cast iron sleeves and lead joints, and, for service connections, using a clamp or saddle. The latter is indispensable.

After all the manufacture and distribution of coal gas present no features that should trouble a systematic manager; but when it comes to dealing with a multitude of consumers, or running an electric annex, it is quite another affair.

On looking over the foregoing I find that I must change the heading of the paper. It should read, "The way we do it where I live."

Discussion.

The President—Gentlemen, you have listened to what might be considered an old-time gas man's ideas of a gas works. He acknowledges that he is outside the pale of generative or regenerative furnaces. Those who have used such recognize that open settings are things of the past, where coke is to be saved. We would like to have suggestions from anyone running a small gas plant.

The Secretary—Has anyone present had any difficulty from naphthaline by the use of a steam jet exhauster. Do you use a steam jet exhauster, Mr. Adams?

Mr. Adams—I use a steam jet exhauster, and have not had any trouble with naphthaline.

Mr. Petch—I had trouble with naphthaline about four years ago, but I attributed it to the fact that we were carrying almost a white heat in a half depth furnace. At one time the tubes were so stopped that I could not get my fingers through. I introduced steam on the bottom, to blow it off, and the exhauster stopped up with a kind of tar substance. When the heat got down to normal intensity I did away with it entirely. I find that invariably as the heat goes up the candle power comes down, I think it is a matter of getting any kind of yield you want. I don't think it is possible with the ordinary coal to get more than 4½ feet to the pound. The Australian coals, such as Wallsend and the like, that we use, have often yielded us almost 5 feet. When the candle power was away down I had to use 4 or 5 per cent. of shale to bring the illuminating power up.

The Secretary—Where did the naphthaline bother you most?

Mr. Petch—In the condenser.

The Secretary—Did it ever reach the consumers' meters?

Mr. Petch—No; it did not go beyond the center seal, save at one time the seal at the meter was stopped. I think probably that was from cooling the gas too suddenly, and also from very high heats. We were making a very large quantity, and pumping it through the exhauster very fast, and it needed a good deal of water.

Mr. Jones—I have heard of many instances where naphthaline was attributed to the use of steam jet exhausters, but I fail to understand how it can be so brought about. Nevertheless it has been positively asserted that the steam jet exhauster is often responsible for naphthaline formations.

The Secretary—What condition of the works would carry the naphthaline forward to the consumers' meters?

Mr. Jones—The temperature, I think, would hold the naphthaline in suspension. I think it is better to make naphthaline and sell it to the consumer than not to make it at all. It is certainly one of our best illuminants. That the higher hydrocarbon benzol vapor and naphthaline can be carried ahead successfully does not admit of doubt, and there is a peculiarity in the mixture of coal and water gas in that it has sustaining power in the carrying ahead of these higher hydrocarbons. I believe this was explained by Professor Lewes in one of his lectures, published in the AMERICAN GAS LIGHT JOURNAL. Mr. Petch asks why, if the steam jet exhauster will cause deposits of naphthaline, steam will act as the remedy to dissolve it. I can only suggest that naphthaline, being one of the heaviest of the hydrocarbons, on the border line between vapor and gas, and the heavy condition in which the steam is when mingled with gas in the steam jet exhauster, that one would have a tendency to drag down the other. Its overburdening of the gas and condensation of the steam would have a tendency to carry with it these heavier hydrocarbons, which, while the steam would pass away as water, naphthaline might be deposited as a solid substance, or it might, under some conditions, go with the water to the drip.

The Secretary—The reason I asked those questions was that a great many have stated that naphthaline was the result of the steam jet exhausters in accordance with the statement made by Mr. Burrows. We have been using steam jet exhausters about 10 years, and we send the gas down to the purifiers, through a length of about 1,000 feet of pipe. We have had occasion to open the pipes three or four times in the past year, only to find them absolutely free of any deposit whatever. The pipe was just as clean as if water had been running through it instead of gas. Not even any tar had been deposited. We, however, have had quite a lot of trouble with it at times in our consumers' meters, and that is the reason I asked the question whether it could be attributable at all to the steam jet exhauster under those conditions. I cannot see why it should be. The naphthaline appears near the consumers' meters largely at the raise or elbow of the pipe to the meters, and I find, in 9 cases out of 10, where the elbow is out of the ground, just at the point where there is an exposure or change of temperature in the pipe, the naphthaline forms.

The President—Previous to the building of our new works in Napa I never knew what naphthaline was; that is, I never saw what I knew to be naphthaline. We had not been using any exhauster in the old plant, but in the new works an exhauster was placed Then our trouble with naphthaline began, and the bother extended to the furthest point of the main, through all the ramifications of the pipe. In cleaning out the service pipes we blew it out in the shape of fine dust, resembling the scale of isinglass. I attributed its development to the fact that we were taking a larger yield from the coal than any we had previously obtained. Respecting chilling in the condenser, we found that that cuts quite a figure—that the outlet of the pipe and condenser would oftentimes be clogged completely up; so we introduced steam at that point in order to throw it back to the bottom of the condenser again. But we introduced a solvent. That we thought assisted us a great deal in doing away with the trouble. Of late years we have not been bothered by any complaint from that source.

Mr. Rice—It seems to me it would be highly unfair to charge naphthaline to the steam jet exauster. They irrigate a great deal in Riverside, and it is very often the case, where we pass through an orchard, or our services come near the top of the ground in the ditch, that we will have naphthaline formations just about the line they irrigate; and it would come sharply on the line of that wet ground in the orchard.

So it is seen that we have naphthaline from other sources than from the steam jet exhauster. As a rule, where the steam jet exhauster is put in small gas plants they immediately get up a higher temperature, and that, no doubt, in my estimation, accounts to a certain extent for naphthaline.

The President—I will qualify the statement in relation to the exhauster. In sustaining itself as an exhauster it was drawing more from the coal than it got before. I don't wish to intimate that the steam was the cause of the naphthaline, but we extracted more from the coal than we did before.

Mr. Gregory—Mr. Rice voices my sentiments. My study along that line has taught me that high heat and sudden condensation of the gas will produce naphthaline. He found that in irrigating, where they had been pouring water around his pipes in the orchard, at that line naphthaline would occur. Where it was condensed suddenly naphthaline would show itself.

The President—It would be the result of a shock to the gas?

Mr. Gregory—Yes, sir.

On motion of Mr. Quilty, a vote of thanks was passed to Mr. Burrows for his paper.

The President introduced Mr. C. O. G. Miller, of San Francisco, who read the following paper on

THE UNIFORMITY OF GAS ACCOUNTS.

To the Officers and Members of the Pacific Coast Gas Association—Gentlemen: This paper is the result of a letter received by me on the 22d of last March from our Secretary and Dictator, in which he stated he thought it would not take over one hour, or two, of my time to write a paper on "Uniformity of Accounts."

Immediately on receipt of the above mentioned letter I began my paper, and can assure you that, poor as it may be, its preparation has taken much more than one hour or two, and a large amount of paper not shown here.

I remember once hearing a lady, who prided herself upon her knowledge of domestic affairs, telling a friend she did not approve of the deep pans used by him to stand his milk in—saying the shallow pans collected more cream. The friend replied, "You cannot fool the cream." There is a certain amount of cream in milk, and it rises to the surface in deep as well as in shallow pans, and no system or style of keeping accounts will make you a saving in your cost; but a uniform system of accounts, in use by a number of companies, facilitates comparisons, and may lead to large savings.

At first thought I intended to glean something from the reports of the Massachusetts Board of Gas and Electric Light Commissioners, and the reports to stockholders from The Gas Light and Coke Company, of London, which Company sells 20,000 million cubic feet of gas annually—in its last report is mentioned a gain of 58,000 consumers in two years; but I found the Massachusetts reports gave no detail of the cost of operating works, and the London reports gave no detail of the cost of their plant. So I decided to tell you the manner in which the companies of which I know the most keep a record of their business.

I shall, first, give you an account of a large company's method. A report, styled "Daily Report," is made out daily at the works and sent into the office. This report shows the amount of coal and oil used, stating separately the coal used in retorts, generators, under boilers and under retorts. It gives the reading of the station meters, showing the total amount of gas manufactured and delivered from the works during the previous 24 hours. It also gives the height of the holders, in feet and inches, and contents of the holders; gauge of oil tanks; make of coal and water gas separately; pounds of coal used per 1,000 cubic feet of water gas made; gallons of oil used per 1,000 cubic feet of water gas made; coal, coke, oil tar and coal tar sold; oil and coal received.

On the back of the report is the name of every man employed and what he was doing. The report is written and printed in copying ink, and a press copy taken before being sent to the office, so that the one writing makes a complete record for office and works.

The leading facts from the daily report are entered at the office in the "Manufacturing Book," one double page being given up to each month. This book shows in detail the monthly consumption of all the important factors in gas manufacture. The amount of oil and coal on hand and gas on hand the morning of each day; the total output of gas each day; the state of the weather, morning and afternoon, and the corrected barometer readings, at 9:30 A.M. and 4 P.M.

Every half month a record is made in the "Manufacturing Book" of the materials used per 1,000 cubic feet of water gas made. Statement books, consumers' ledgers, and the auxiliary cash book, for gas sales collections, are so familiar to you that they need no mention.

The following mentioned accounts are usually sufficient for the general ledger. I call this Form "A."

Allowance on gas bills.	Gas sales.	Repairs general.
Cash.	Interest.	Repairs to meters.
Capital stock.	Manufacturing.	Repairs to mains and service.
Coal.	Manufacturing labor.	Repairs to works.
Coke.	Meters.	Services.
Distribution.	Oil.	Street mains.
Dividend.	Profit and loss.	Tar.
Deposit.	Purification.	Taxes.
Expense.	Purifying materials.	Works.
Gas account.	Real estate.	

The principal permanent accounts in the general ledger are "Street Mains," which include cost of all pipe, cast or wrought, used for mains; labor in laying pipe, drayage, lead, rope used for caulking, and anything else used solely in or for laying mains.

"Meters," cost of gas meters only.

"Real Estate," cost of real estate, fencing, sidewalk and street work, bulkhead, etc.

"Services," account covers wrought pipe used for connections between street mains and customers premises, meter couplings and meter shelves.

"Works," includes cost of all improvements and fixtures on the works.

"Capital Stock," the amount paid in and furnished by the stockholders.

"Profit and Loss" account, the amount of profits undivided or unappropriated. The accounts that embrace the operation are more numerous.

"Allowance on gas bills," speaks for itself.

"Coal." All payments for coal used and on hand—less coal sales, if any.

"Coke." For collected coke sales.

"Distribution." All labor of taking statements, setting and removing meters, etc.

"Expense." Office rent, salaries and office employees, other than the superintendent; telephone, stationery, keep of horses, and all general expenses not otherwise classified.

"Gas Account." Shows the total sales of gas in dollars. A journal entry should be made as of the last business day of each month, charging "gas sales" and crediting "gas" for the total amount of gas sold during the month, as shown by the consumers' ledgers, and all collections of gas bills should be credited to "gas sales account."

"Gas Sales." Total amount of uncollected gas bills.

"Manufacturing." Includes superintendent's salary and all the minor supplies used in manufacturing, such as lubricating oil, water, waste, etc., and small items used at the works.

"Manufacturing Labor." For wages of men occupied solely and specifically manufacturing gas, such as retort and generator men, engineers and boiler firemen.

"Oil." Total cost of oil on hand and used.

"Purification." Solely labor of men in purifying house.

"Purifying Materials." Solely materials used in purification, such as lime and oxide.

"Repairs, General." All repairs other than to meters, mains and services and works.

"Repairs to Meters." All expense of repairing and testing meters, and cost of all meters destroyed by fire, or any other cause.

"Repairs to Mains and Services." Account might be called "maintenance of mains and services," and to this account should be charged all items pertaining to "mains and services" that cannot properly be charged to street mains or services. I charge to this account labor for moving mains and renewing or enlarging services, and the pipe, used in renewing or enlarging services.

"Repairs to Works" is another way of saying "Maintenance of Works," and to this account should be charged all items used about the works, including labor that cannot properly be charged to manufacturing, manufacturing labor or works.

"Tar." Collections for sales of tar.

"Taxes." City, county and State taxes, and municipal license, if one exists, for the lighting business.

Other accounts may be added, such as:

"Improvement Account," for movable property not at the works—as wagons, horses, etc., etc.

"Litigation Account," if you must have litigation, and

"Vacation Account" is a good one to have, for both the company and its employees.

"Sundry Creditors" is a useful account, and is used largely at the end of the business year, when journal entries are made for all bills not due but accrued against the company.

"Sundry Debtors" may be used for the reverse purpose from "sundry creditors."

Although I have never heard of any company keeping an "Experience Account," I think the account exists—sometimes the experience charge goes to swell "mains and meters account;" but more often to "works account."

The cost of gas in holders is made up at the end of the year as follows: An inventory of the supplies on hand is taken, and the amount deducted from the various accounts; then the balances of the following accounts are added together: Coal, oil, manufacturing, manufacturing labor, purification, purifying materials, repairs general, and repairs to works.

From this sum is deducted the amounts to the credit of coke account and tar account, and the remainder is the net cost of the gas made, in holders.

The distribution accounts are, "Allowance on gas bills," "distribution," "expense," "repairs to meters," "mains," "services" and taxes, to which should be added the amount of gas bills lost, or estimated lost, and litigation and vacation accounts, if used.

For smaller works, where the electric light business is combined with the gas business, I recommend accounts as follows, which I call Form "B."

Cash.	Gas manufacture.	Electric labor.
Capital stock.	Gas repairs.	Electric repairs.
Profit and loss.	Expense.	Electric manufacture.
Real estate.	Taxes.	Carbons.
Gas works.	Electric light works.	Incandescent lamp renewals.
Street mains.	Transformers.	
Services.	Arc lamps.	Electric fuel.
Gas meters.	Electric light meters.	Electric wiring and fixtures.
Gas.	Poles and wire.	
Gas sales.	Electricity.	Dividend.
Coal.	Electric light sales.	Sundry creditors.
Gas labor.		

The accounts above have the same significance as those mentioned in Form "A," excepting "repairs account" covers all repairs.

The "labor account" includes all labor and salaries, the salaries of superintendent and officers being divided between gas labor and electric labor, as the judgment of the manager may decide.

At the end of the year "expense account" should be divided between the gas and electric department on the same basis.

"Taxes account" should be divided between gas and electricity, at the end of the year, according to the assessments.

The electrical accounts in Form "B" correspond with the gas accounts, and I think require no comment.

Monthly Business Statements.

I think every gas and electric light company should, monthly, make up a statement of the business done, showing receipts and cost. I call these statements "estimates;" that prevents any serious criticism if the 12 estimates do not add up the amount of profit or loss shown by the ledger. I submit three forms: Form "C," for a gas company doing a large business; "D" and "E," for gas and electrical department of a small company.

FORM "C."—*Estimate for* ....., 189..

Amount of gas sent out by station meters.... .... cu. ft.
" " accounted for..... ..... "
" " unaccounted for..... ..... "

Divided as follows:

..... cu. ft., at .... per 1,000
..... " " .... "
..... " " .... "
..... " " .... "

..... cu. ft., sold at .... per 1,000
..... " used at office and works.

..... Total accounted for.

Cost.

..... tons Wallsend coal; at..... .....
..... " Greta coal at..... ....
..... " ....
..... " Welsh anthracite coal, at .....
..... " ..... at ....

..... gallons oil ....
Manufacturing labor..... ... .
Lime ....
Purification labor..... .....
Purification material (estimated)..... .....

Taking statements and distribution (pay roll only): Office rent, porter, telephone, board of horses, watchman.

Salaries: President and secretary, and treasurer, and directors' fees.

Salaries: Collectors, bookkeepers, cashier, accountant, superintendent, etc.

Attorney's fees, insurance, vacation account.

Taxes and repairs (estimated).

Bad accounts, petty cash items, manufacturing supplies (estimated.)

Total cost..... .....
Charges for gas sold ....
Receipts for coke and tar..... .....
" " ....
" " ....
Total credits ....
Estimated profit..... .....

FORM "D."—*Gas Report for the Month of* ....., 189..

Amount registered by station meter .... cu. ft.
Amount of gas consumed by meters..... ..... "
Amounts charged up for—
..... cu. ft. gas sold at ..... per 1,000 $.....
..... " " " ..... " .....
Received for sales of coke ....
" " tar ....
Other receipts ....
Total..... ..... $.....

Cost.

Coal carb., ... lbs, at $..... per L. T. $.....
Shale " ..... " " ..... " " .....
Lime " ..... bbls., at ..... per bbl. .....
Salaries and labor ....
Water, taxes..... .....
General repairs, incidentals (estimated) ....
Total cost..... $.....
Estimated profit ..... $.....

FORM "E."—*Electric Light Report for Month of* ..... 189..

Amounts charged up for—
City lighting..... $.....
County lighting..... .....
Commercial arc lights, midnight circuit ....
" " 9:30 P.M. ....
Incandescent lights, midnight circuit ....
" " 9:30 P.M. ....
" " residence, flat rates..... .....
" " " meter rates..... .....
Other receipts..... .....
Total ..... $.....

Cost.

..... cords wood, at $..... per cord... $... .....
..... carbons, at ..... per 1,000.. .....
..... globes, at ..... each..... .....
Salaries and labor..... .....
Water, taxes, insurance..... .....
Sundry manufacturing supplies..... .....
General repairs and incidentals (estimated)..... .....
Total cost..... $.....
Estimated profit..... $.....

Form "F." is for the purpose of keeping account of materials on hand and used. It is:

Material Report for the Month of ....., 189..

ELECTRICITY.	Wood, Cords.	Carbons.	
On hand.....1st.....	.....	.....	.....
Received during the month....	.....	.....	....
	....	.....	.....
Used during the month	.....	.....	.....
On hand.....1st.....	.....	.....	.....

Gas.	Coal, Pounds.	Shale, Pounds.	Lime, Barrels.
On hand.....189..			
Received during the month.....			
Used during the month			
On hand.....189..			

Form "G" gives a statement of meters set and arc and incandescent lamps in circuit as follows:

Statement of Gas Meters Set and Lamps in use.....*1st*, 189..

Meters.	3-Lt.	5-Lt.	10-Lt.	20-Lt.	30-Lt.	.. Lt.	.. Lt.	Total.
Number....								

	All Night.		Commercial Circuits.		
	City.	County.	9:30 Circuit.	Midnight Cir'it.	Total.
Arc lamps..					

	Commercial Circuits.			Residences.		
	By Meters.	9:30 Circuit.	Midnight Circuit.	Meter.	Flat Rates.	Total.
Incandesc't circuits.						

In the forms for estimates of profit I enter all the sales for the month irrespective of the collections, and only coke and tar sales that have been collected for. Experience has shown that system is the best for our purposes.

A few years' experience will teach a manager how much to allow for taxes, insurance and repairs accounts.

Discussion.

The President—Here is a very difficult question to formulate, to suit the conditions and circumstances governing existing works. The idea is to formulate accounts so when meeting here we can talk intelligently on the subject of counting the cost of the gas from the coal through the works, and until the receipts are in the hands of the treasurer. Is there any suggestion to be made on this matter?

The Secretary—I think in justice to Mr. Miller it should be stated that his is a paper which has required more than ordinary care to prepare, and is one that shows to the least advantage in the reading, and until it is published in the official organ of the Association we will not be fully able to appreciate what it means. This is a subject in which every member of the Association should be very much interested, that is, to try and get as near to uniformity of accounts as possible. We have been trying to do that for some years in this Association, and at the last meeting Mr. Miller and myself were appointed a committee to draft a system for uniformity of accounts. I think I have cleverly got Mr. Miller to do the work. He has prepared this paper, spending a great deal of time on it and it will be a long table for you to look at, especially in the matter of facts. In conjunction with that I have a scrap book containing the forms in use in cases covering about all the details of the business that we have to do with that I think will pay you to look over. You may get an idea, from the scrap book and from Mr. Miller's paper, that will save you and your clerks many hours' labor and care, and that will give you many a day of satisfaction.

Mr. Jones—In the discussion I would like to say a few words about Mr. Miller's paper, for I realize the amount of labor required in getting up a paper of the sort under review. He deserves the hearty thanks of the Association. If you will grant me a moment or two I would like to tell you something about the accounts of the San Francisco Gas and Electric Company. When the two Companies combined we found it necessary to simplify our methods of bookkeeping and to get our books in such condition that they could be more easily handled, so that there would be no mistake in recording such a vast business, and that the supplies purchased could always be charged where they belong. Mr. Barrett, the Cashier of the Company, and myself worked together on the formulation of this system of bookkeeping, which has some novel points. I will not make it too tiresome by reading all these accounts, but still I think you will be interested in them, and if our members want a copy of these accounts for their information, I can arrange to get them these printed forms. In the first place our books are kept almost entirely by numbers. We have here practically 64 accounts relating to gas, numbered from 1 to 64; some of the numbers being duplicated, as 1A, which means coal gas, and 1B, which means water gas, so we can separate the expense of manufacturing each kind of gas. I will run over them hurriedly. The gas accounts begin in this way: 1A, plant (coal gas); 1B, plant (water gas); 2, supplies; 3, coal; 4, anthracite coal; 5, gas coal; 6, purifying materials; 7, pipes; 8, meters; 9, lamps; 10, teams; 12, manufacturing; 13, sundry creditors; 14, gas sales; 15, coke sales; 16, tar sales; 17, ammoniacal liquor sales; 19, gas stoves; 20, gas deposits; 21, pipe deposits; 22, old material; 22A, coal gas, old material, manufacturing; 22B, distribution, old material; 23, creditors' discount; 24, meter rents; 25, wharfage and rents. Then, from 30 up we have manufacturing expense; coal carbonized; anthracite coal used; gas coke used; 35A (coal gas); 35B (water gas); 36, works' supplies; 36A, works' supplies (coal gas); 36B, works' supplies (water gas); 37A, wages at works (coal gas); 37B, wages at works (water gas); 37A, R., wages at works (coal gas), retort house; 37A, P., wages at works (coal gas), purification; and so on down through the superintendent's and labor accounts. We have printed instructions to the different foremen for keeping their time books and in their ordering of material to be charged to these accounts. No. 7 is the pipe account. It is for new services, new temporary mains, and new mains. No. 44 is for repairs of pipes, repairs or renewals of services, temporary mains, or mains. No. 8 is for meters; setting meters or making connections for same where never set before. No. 45 is for repairs to meters; setting, testing, or removing the meters, or making connections for same where set before. No. 9 is for lamps; setting lamps where never set before. No. 46 is for repairs of lamps; repairing, removing and renewing lamps and lamp tops and burners. No. 43 is distribution wages, statement taking, and any other wages than above, such as for pumping drips and freeing stoppages in services, house pipes or mains. No. 47 is repairs to distribution plant; any repairs of distribution plant, and distribution supply account. Any labor for absolutely new work done within the gates of the works, such as large extension of the works, etc., would be charged to plant account. No. 38, repairs to manufacturing plant. No. 38A meaning for repairs to manufacturing plant, coal gas; 38B meaning for repairs to manufacturing plant, water gas; 39, any labor on repairs of works. No. 42, articles purchased, as shovels, picks, tools of all kinds, waste, oil, rubber bags, coal for street use, gasoline for the clearing of services, coal oil, lanterns, etc., in fact, anything that is used, not to stay in the ground or form part of the actual material of the thing repaired. Lead and packing are properly chargable to "Repairs to Pipes" and "Pipes," as they enter into the construction of the pipe system. When ordering material be particularly careful to state exactly for which account it is to be used, whether pipe, or fitting, or material for any of the foregoing accounts, or "Distribution Supplies," as above. The number printed beside the account named refers to the ledger number of the account, and may be used instead of a name when charging time or ordering material. You can readily realize what an immense amount of time may be saved when approving bills, instead of marking "Distribution Supplies," I simply check it off as No. 42, and that refers to our ledger account. Our whole system is kept up by these numbers. We find it very useful in that way and could hardly get along without it now. I do not think I will take your time to read any of these others, but I will leave this on my desk, so that any of the members may see it, and I will give them copies of it, if they wish.

The President—That is a very interesting paper, both for uniformity and system. I think that a great many of us can take good points from it. It is useful in segregating accounts.

On motion of Mr. Gregory a vote of thanks was tendered Mr. Miller. The Secretary then read the Roll Call.[1]

AN INVITATION.

The Secretary read an invitation from Messrs. Thos. Day & Co., of San Francisco, asking the members to inspect their factory, the visit to be made on the afternoon of July 14th. On motion of Mr. Clements, the invitation was accepted, and a vote of thanks was passed to Messrs. Thos. Day & Co. for their courtesy.

Mr. C. W. Quilty, of San Jose, here read his paper on

MUNICIPAL CONTROL.

A Legal, Commercial, and Political Review of the Question of Municipal Ownership of Semi-Public Enterprises of Profit.

From a legal standpoint the primary function of government is rule, law, regulation.

1. For roll call, see JOURNAL, July 26, p. 121.

Law itself is a rule of action ; law supposes the highest disinterest ; ownership implies the highest self-interest.

Hence, the idea of municipal government and municipal ownership expresses diametrically opposed propositions. The State is the representative of the people, and has only such rights as are surrendered by the individual. In our republican form of government the inalienable rights reserved by the founders of our constitution are preservation of life and liberty and the acquisition of property; and it was never intended that our government should be interested in properties of a speculative or commercial nature.

We see in an imperial form of government where the State may own and develop mines of quicksilver, as Spain, and work them on shares with the Rothschilds, foreigners to Spain. We see how Sweden owns its telephone system, and the German and Russian governments their railway systems, and we further note how single tax advocates refer to Roman history when the Empire owned and controlled the public lands and leased out so much, and so, to each citizen.

In the countries referred to the State is supreme; the right of the citizen is secondary and by grace of State ; but in our republican form of government the citizen is superior to the State in his right to the pursuit of liberty, property and happiness within the law.

If, on the other hand, it were maintained that our government had a legal right to own and operate railroads, telephones, street cars, water works, gas works, mines and agricultural lands, the proposition would eventually be so stretched and elaborated by degrees that the government would eventually regulate the sale of bread, meat and drink ; in fact the latter is the case of South Carolina, which assumed to itself the entire right to sell all alcoholic beverages in that State.

A citizen of California, finding the sale of his wines interdicted in that State, contested in the Courts the prerogatives assumed by the State of South Carolina, with the result that the courts declared the law unconstitutional, and the exercise of such functions and restrictions as contrary to the fundamental principles of American liberty.

Dropping, however, this South Carolina case, suppose that the State had a right to exercise all these powers of ownership, manufacture and sale of wares and goods and regulation of charges and prices, what would such a system of government drift into? What would it result in?

The deepest thinkers and highest students of political economy say that such a government would rapidly resolve into a patriarchic or paternal form, where the entire mass of the population would look to the central government for their physical, as well as civil and political support and care. The mass of the citizens would be listless peons. Such a system of government would kill competition, choke development, destroy enterprise, chill ambition and make the inventive, grasping, active, aggresive American a listless, helpless, dependent of the State. He would work government hours at government pay, eat government food at government prices, and move about on government railways on government time, a long time.

Such usurpations of government rights have occurred before.

The Pharoahs commanded the labor and controlled the granaries of the Nile, yet ruled a nation of slaves. Ancient Rome and Spain, following the same theories of government, lost their aggresive spirit ; and here in California, where that patriarchal, paternal rule was attempted, as in the old missions where there were thousands of neophytes, and thousands of acres of land, and thousands of herds of cattle, which were the common property of the mission, we found that the entire system melted away and would to day be impractical, in the face of the modern spirit of enterprise and liberal government.

We thus see, from a review of other governments and civilizations, from the opinion of philosophers and political economists, from the decisions of our own courts, and from the analysis of the principles of our constitution, that the assumption that a State or municipality should own and operate properties of commercial or speculative value is an illegal assumption and a radical step towards either imperialism or paternalism.

We now proceed to the commercial review of the question of municipal ownership.

If municipal ownership be granted, we ask, for what purpose? Is it for profit to the city, or protection and aid to the inhabitants?

If for profit, then the city abandons its administrative, legislative and police power, and becomes a vendor and competitor for gain. From whom? From the consumers, some of its own citizens. In the construction of such works money must be raised and bonds issued, which are bought by foreign bondholders, the interest on which must be paid by general taxation, not by the users of street cars, railroads or lights, but by the general public, and the history of such transactions on this Coast is, like in the cities of Alameda, Santa Cruz and Tacoma, millions of dollars' worth of bonds have been issued, the interest on which the municipal enterprises never have nor can ever expect to earn, and the burden of paying which encumbers the property of every man, woman and child in the community.

If such enterprises were owned by the citizens of the community, the bond interest would be kept at home in the shape of local dividends, and only those who use street cars, lights, etc., would pay the cost of the service.

If, on the other hand, municipal ownership be advocated as a means of protection to the citizen, we ask, what class does it protect?

Not the consumer, but the property owner. The consumer is here to day and there to-morrow ; but the property owner is here always and at all times, and the greater his possessions and the higher they tower the greater protection he needs and the lesser the cost of taxes to the property owner, if the city engage in profitable enterprises with the non-property owner.

Hence we see neither profit nor protection to the mass of the citizens in the conduct of municipal enterprises ; for the reason (to use a localism) that the mass of citizens will not be "in on the divide."

As the law now stands it affords all the protection that law can give, compatible with human weakness and cupidity. The services of all these enterprises are at the command of the consumer and the regulation of the charges delegated to the representatives of the consumer. If the peoples' representatives err it is not because of the fallacy of the principles here advocated.

There is still another commercial phase of the question of municipal ownership.

Ownership is something more earthly and tangible than the abstract rules of law or government. Sacred writ declares that man is entitled to the fruits of his labor and the bread earned by the sweat of his brow. It is explicit on the question of ownership of lands and flocks. It has been admitted by all mankind, for all ages, that the individual is entitled to and owns all that he creates, produces or legitimately acquires.

The laws of nature require that man shall shear the wool and harvest the grain in season, and provide for nature and winter, and the accumulations are his ; and should 99 other non-workers, in times of cold and famine, seize his wool and stores, then all would perish.

Hence, from the foregoing, we find that there is ownership as sanctioned by religion ; there is ownership as required by the by-laws of nature for the survival of the fittest ; and, lastly, there is that civil commercial ownership as fixed by law and the common consent of all men for all ages.

What is capital or wealth? It is the representative of the accumulation of effort. It is the most vivid type of the conservation of energy, whether represented by gold, real estate, buildings, water works, gas works, railways, herds or grain ; it is in fact the accumulation of labor or effort. If a man work night and day, consistent with life, and with pump lift up tons of water, the weight of which will move machinery, these tons of weight represent so much worth or capital, so much effort. Likewise, in regard to grain, herds, gold, buildings and realty, they represent just so much accumulated savings and work, and under our civilization have an earning value themselves, just as the tons of weight of lifted water have a value to move machinery.

Wherein, then, lies the attempted distinction of the property interests of water works, gas works, electric light works and railroads from the other property values in realty, grain, gold and flocks? There is no distinction, except in form, and there is no reason why the government should seize on the former, and for the time being leave the latter to the people. It is the principle of government ownership that I contest, not the expediency or desirability of it in some isolated cases. If the principle of government ownership be admitted in one case, then, I maintain, it can apply to all.

Gas, water and railway properties differ only in name and use from the forms of property and wealth. Their worth depends upon their earning capacity and the amount of capital invested or accumulated, like the tons of water stored for available use.

Gold in itself is not wealth or value. It is simply the representative of wealth. Hence the wealth or accumulations represented by gas, water, electric light works and street railways have no value or property difference from herds, grain, gold, real estate or majestic buildings.

As property the mains of the San Francisco Gas Light Company, the pipes of the Spring Valley Water Company and the conduits of the Edison Electric Company laid under Market street are subjects of private ownership and legal protection, as much so as the lofty edifices towering over the same street, and owned by the Crockers, the Parrots and the Phelans.

Single tax advocates and communists look with more horror and

hatred on the wealthy owners of hundreds of tenements, blocks of stores and acres of business property than on the hustling gas man who visits you weekly, or the monthly water man, or the perpetually "on the go" railway man. Single tax advocates look upon the rich property owner as a barnacle, a non-toiler, whose accretions of wealth cannot be stopped, controlled or made to contribute to the profit or protection of the masses. The owner of a sky-scraper pays the same tax rate as the owner of a hovel.

In commercial life competition is constantly lowering the rates of all kinds of service of public interests. Gas rates are getting lower and lower year by year, street car fares are being gradually reduced, electricity is sold cheaper every year, water works can be duplicated (twice and thrice from the Sierras in our case); but where is the competition in business property? The owner owns from the deepest depth of the bosom of mother earth to the glittering stars, and mankind may envy him and rail against him, but cannot compete with him, and cannot control his charges for the use of the buildings or the land.

Thus, commercially, while gas and water mains are property, they are not so desirable as buildings, and not so desirable as many other forms of wealth, and why the law should attempt to place a heavy hand upon such properties and offer the aegis of its protection to that which is already secure, like business properties and the like, is something inexplicable to me, and foreign to the liberal spirit of our institutions.

My remarks concerning the political phase of municipal ownership of public utilities will be short. They will be readily appreciated by every one conversant with modern American politics. Owing to the short tenures of office in the country, and the ever increasing struggle for office, many of those who acquire short-lived power immediately set about perpetuating themselves by preparing for re-election or recouping themselves for expenses incurred. Their friends and followers must be provided for. Offices innumerable are created, and legions of deputies and assistants appointed. Frauds, political corruption and high taxation are the stories of every large city in this Union.

The present departments of city government are our mayor, supervisors and clerks, courts, superior and justices' courts and clerks, school departments, with hundreds of teachers, police departments, with thousands of policemen, fire departments, street departments, inspectors of this and that, and their deputies and assistants, and if we add to this horde of hungry office holders the further additions of gas works department, water works department, electric light department and street railway departments, and the hundreds of superintendents, clerks, laborers, collectors and employees necessary to run the latter large institutions, the municipal government would become so unwieldy, so complicated, and with such an army of employees that there could be no accountability, no supervision, no economy and no experience acquired.

Fraud, extravagance and loss would inevitably result, the ultimate burden of all of which would fall on the real estate owner.

Statistics show that in nearly every instance where municipalities have attempted such ownership the result has been a failure. In Birmingham, England, the municipal gas works have been a success. Why? Because the tenure of the trustees' office is for life, and office under the English government carries so much of honor with it that the ablest and best men compete for place, and the disgrace of doing wrong, and the swift punishment following, are terrors to deter their wrongdoing, terrors which our American office holder laughs at.

Mr. M. J. Francisco has done great service by publishing two works on "Municipal Ownership and its Fallacy."

In these works are tabulated in extenso the hundreds of cities in these United States which have attempted municipal ownership, showing the incredible cost of their systems, the extraordinary cost of operation, the failures and the abandonment and sales of municipal plants to private capitalists, or their dismemberment and disposal for junk. Mr. Francisco gives the detail of every municipal lighting plant, from that of Chicago, the most notorious corruptly managed plant, involving millions, down to the plant installed by Hamilton, Ohio, which has cost $575,000, and which has been as reported ordered shut down for want of funds to run it.

This government can work its employees and fight its soldiers, but it cannot create generals, diplomats, statesmen, orators, financiers, engineers, nor electricians. No human agency can, in the short term of two or four years, transform a ward politician into a railway manager, or a calculating engineer or a nervous, wide-awake electrician. It is useless to write further on the political phase of municipal ownership; it would be an inexhaustible theme.

In conclusion I would say that isolated instances, no matter how numerous, will neither establish nor disprove a principle. In the cases of municipal ownership, the overwhelming instances of failure would tend to disprove the theory of municipal ownership. Reference is often made to Mayor Pingree's potato patch for the poor, which for a while was a success, but when truckmen and farmers found no sales for their wares, they went to neighboring towns; a loss of trade to Mayor Pingree's city followed and caused complaint from tradesmen.

When the rural representatives of the legislature of the State of New York passed a law forbidding the serving of lunches in saloons, and congratulated themselves that they had done much for temperance, they repented a few months later when the saloons stopped buying cheese. The thousands of saloons in New York, Syracuse, Buffalo and hundreds of other cities of the State of New York stopped dispensing cheese. The rural legislators impatiently awaited the convening of the next legislature to immediately undo the noble work they thought they had done.

I contend for principle. One of the foundation stones of this government is its simplicity. By adding to it innumerable prerogatives, and extending its operations and ramifications, it becomes, like any other over-enlarged human institution, unwieldy, inoperative and the prey of human abuse and rapacity.

In conclusion I will say that there are exceptions to every rule, and while under the test of abstract reason and the search of philosophical inquiry we can find nothing in the principles of government, either civil or divine, which justifies a nation in operating a postal system, yet in practice that branch of government is so successful that all men admit the wisdom of its maintenance. As kindred duties, many of our best citizens think that the government should own and operate the telegraph and telephone systems of the Nation, although Americans, when using the telegraph in England, which operates its own system, declare the blankety-blank system so blankety-blank untrustworthy and slow that they go afoot to deliver their messages; still we think telegraph and telephone systems might be operated by the government with safety, by the issuance of stamps good for so much communication, by which the government would have absolute control of the finances, and the employees be so many machines for performance of service.

But in all other occupations of profit, genius, experience, inventive and administrative ability are required, which cannot be expected from political office holders.

This is too big a subject, too "pregnant with the fate of Cæsar and of Rome," too portentous to this Republic to be handled by magazine writers and mushroom political economists.

I am now asked, if you deny municipal ownership, what is the remedy for the abuse of the use of semi-public utilities by private citizens? My reply is, the remedy is municipal or governmental control.

In the idea of law or rule of action is embraced the attribute of control, but not that of ownership. Municipal or governmental control is the solution. Our republican form of government already controls that overwhelming, irresistible human passion to *rule* by saying there shall be no king, no dictator; it controls that second most powerful passion of religious intolerance, by saying thou shalt not throttle thy neighbor in his *belief;* it controls that further terrible human weakness of revenge, *murder*, by a punishment befitting the crime; it controls further that seductive siren, the passion of lust that tempts man to tear from his form that tenderest, sweetest, vine of human affection and love, true wifehood, and punishes him for adultery or seduction, and compels him to support offspring whose paternalism he himself doubts; it controls his business affairs and dealings that he does not overreach or defraud his neighbor. But there is one all embracing human passion, tripping at the heels of lust and murder and ambition, and that is avarice, the insane desire to grasp all and everything, a passion which the law does *not control.*

I am an advocate of the control of incomes; that is the solution. England has attempted it and has it in partial operation. I would control, over and above a certain reasonable interest on their investments, the incomes of gas companies, of water companies, of street railway companies, of all corporations, banking, mercantile and otherwise, and of all individuals so that the overwhelming rich should maintain the government that protects their millions and should assist the existence of their fellow human beings upon whom they profit.

In conclusion, I say that I draw a distinction between government *ownership* and government *control.* Control does not imply a deprivation of property or a stoppage of income, but ownership explicitly expresses the taking of the property and its earnings.

Such a latter policy, as has been outlined in this paper, would eventually still the march of American progress, and transform the average citizen into a dependent on the central government and make him like

the ancient, ambitionless tiller of the valley of the Nile, or, like the modern Hindu, who feels that he is fated never to rise above his particular caste.

We believe in the simplicity of government; we believe in government control; but we believe that any further extension of government ownership is an interference with those sacred rights of the individual under the republican form of government founded by our forefathers of the revolution.

Discussion.

The President—Gentlemen, this essay on municipal control has been well thought out. It is a very brainy effort, well considered and well worthy of your deep consideration. Mr. Quilty points out the defects and their possible remedy. I think a vote of thanks should be given on this occasion.

On motion of Mr. Clements, a vote of thanks was extended to Mr. Quilty for his excellent paper.

Mr. Eichbaum—If it were possible and feasible I would move two votes of thanks, because the matter has been handled in a most exceptional and masterly manner. I do not think the subject could be better treated within the space Mr. Quilty has devoted to it, and I think we ought to appreciate this paper in the fullest manner, because it is a subject that really no person but a lawyer, like Mr. Quilty, could handle. He is not only a gas man, but he is a lawyer, for he has given us both sides of the question; and I, for one, want to express my sincere approbation of the article he has given us.

The President—I presume your sentiments are echoed by the members. I do not know whether this allows any latitude for discussion. If any person has anything to say we will be pleased to hear from him or them.

There being no response to this invitation, Mr. C. M. Converse, of San Francisco, read the following paper on

A SHORT HISTORY OF A LONG LIFE.

The question has often been asked, "What is the length of life of a bench of clay retorts?" Perhaps the title of my paper may lead you to suppose that I intend trying to answer that question; but such is not the case. I may be in error in calling this paper "A Short History of a Long Life."

We all know that much depends on the material and care used in making the retorts, the manner in which they are set in the bench, as well as the amount of work they are required to do; and last, but by no means least, the treatment they receive. However, I will give you the record of some of our benches at the Potrero Station, and you can draw your own conclusions as to whether their's were long lives or not.

These benches of which I am writing, as well as all the benches in our new retort house, are, with the exception of two Kloenne Bredel furnaces, full depth, Weber regenerative benches, in settings of sixes. From the first firing they were run continuously for three years and five months, and afterwards gave us five months more of good service before they were finally let down.

We have not been able to always secure the best quality of coal. If such had been the case our output per mouthpiece might have been somewhat greater; nevertheless, the total make was 11,583,000 cubic feet of gas per retort. A description of our method of handling these benches may be of interest.

When first firing the furnaces we close all air ports, both primary and secondary, leaving feeding and cleaning doors open, keeping the fire to the back of the furnace and away from the top of the cleaning door, and have only a slow fire for the first two or three days, or until the bench is quite warm.

We have also adopted the plan of having a port or plughole in the front wall of the bench, just at the crown of the arch, and when first firing we are very careful to see that the plug or stopper is taken out. When the bench is thoroughly warmed we use this port for a flue, until the bench is red hot, thereby avoiding any possible danger of an explosion, when first closing the feeding and cleaning doors.

With these deep furnaces we are enabled to carry an even, high heat (usually a bright, orange color) the whole 24 hours of the day, using for fuel an average of 25.56 per cent. of the coke made.

Our fuel account may seem rather high, but, taking into consideration the quality of the coke, we think this is a very fair showing.

In regulating the air supply for primary and secondary combustion, it was surprising how very small the quantity of primary and the comparatively large amount of secondary air we used.

Our primary air ports were so nearly closed that close inspection was necessary to see whether they were open at all, and it was really astonishing the amount of secondary air necessary for combustion, and the combustion was so nearly perfect that the stack flues seldom showed any flame whatever, except just after fresh filling the furnaces, and then only for a very short time. In fact the stack flues were quite dark, several feet from the top, most of the time.

In order to prevent any cold air rushing into the benches and chilling the retorts we have full fires in the furnaces; when cleaning them using a set of supplementary grate bars, pushed in just below the lintels of the cleaning doors, to hold up the coke. There are rests on the sides of the door frames to hold bearing bars for this purpose.

Our fires are cleaned once each day; a small jet of steam introduced under the grate bars prevents any very hard clinkers forming.

In scurfing we use five tiles—a D shaped hole is cut in a mouthpiece lid corresponding to the shape of the tiles—and also three 1¼ inch holes, to be used as a check draught if necessary.

It takes about 12 hours to remove the carbon. No heavy cutting or ramming with the bar is allowed, consequently we seldom have a cracked or broken retort when doing this work.

In letting down benches we always do so with full fires in ths furnaces, closing up all ports and carefully pointing up every crack and cranny, so as to insure a very gradual cooling. The walls are still quite hot from a week to 10 days after letting down.

After all, this short history would be rather unjust to these benches were it not followed by an explanation, or, rather, a confession; for we plead guilty to unintentional destruction.

In letting them down the last time we did so rather carelessly, because some of the retorts had been patched and several of them repaired at the mouth, as described in one of my wrinkles two years ago. Besides, we had a full set of new retorts for these stacks, so we decided to tear out and rebuild. But, when doing so, it was a great surprise to us to find them in such fair condition, and there was mourning in the house at Potrero that we had not run them through another season.

We consoled ourselves, however, in a degree by only tearing out the retorts and using the old furnaces, which were just as good as when first built, with the exception of a few furnace blocks, which we renewed.

This, then, is the history of these benches. Three years and ten months of good service, an output of 11,583,000 cubic feet of gas per retort, and a premature destruction.

Am I right in calling my paper "A Short History of a Long Life?"

Discussion.

The President—Gentlemen, you have heard from one who has had these benches under his care something that is very interesting from a personal point of view, and he has given you some pretty good instruction. Has anyone else had experience with regenerative benches?

Mr. Gregory—We run the primary up close, but not quite so close as to make a critical inspection necessary to find out whether it was open at all or not. We keep it about half an inch open, while the secondary is 1½ inches open. That, in the main, compared to the other benches, would be the same, and would really corroborate what Mr. Converse said.

The President—Regarding the size opening, what would be the actual area represented? You speak of the inches.

Mr. Gregory—Not much over an inch.

The President—The entire surface of the primaries?

Mr. Gregory—Yes, sir; that is not more than 2 inches wide.

The President—And the secondary?

Mr. Gregory—The same. The half-inch would make an inch. The 1½-inch, of course, would make 3 inches.

Mr. Jones—I hope the discussion will not stop here because the paper comes very close to us all. I did not intend to take part in the discussion, but I must say that Mr. Converse has properly described the true life of a bench of retorts. In giving the duration test of a bench it is absolutely necessary to show how many cubic feet per mouthpiece has come out of that bench. I have seen some of the finest possible benches practically ruined by careless handling. I have seen benches of the most modern type, after one season's work, let down never to be fired again, and it should be a source of great comfort, I think, to all gas superintendents when they get such a yield from benches of retorts. All the retort manufacturers in this country are striving to turn out the very best material; and if one were called upon to decide which manufacturer makes the best retort, a very difficult proposition would be presented.

Mr. Kinney—Does not the maintenance of a uniform heat have as much to do with the long life of a retort as anything else?

The President—Undoubtedly, that has much to do with it, but the running of a regenerative bench is so different from an open fired bench

that those who have used the latter must really forget all they ever knew; the conditions are so different. The manipulation of the secondary and primary, and when to get the proper conditions of each and both, involve as much delicate adjustment as does the manipulation of a Welsbach shutter. In the many transpositions of secondary and primary air it is very surprising, as Mr. Converse remarked, to discover with how little primary air a regenerative bench can be maintained. Great care should be taken that the conditions should be such as to prevent the heat from going too high. I would like to hear the matter discussed, for it is very interesting. To those who contemplate going into regenerative firing it might yield some new ideas.

Mr. Quilty—Is there a saving on the percentage of coke necessary to maintain the heat?

The President—A great saving.

Mr. Petch—Speaking with regard to regenerative firing. Some four years ago our output was materially reduced by the competition of electric light, and although from then until to-day we used the benches only in the day time, I find that the heat can be kept uniform during the night. We bank our fires about 8 o'clock at night, never opening them until the next morning, and we generally, in fact always, find the bench ready for work the next morning. All we have to do is to open up, and, after running the bench about three hours, it gets pretty well baked off before we undertake to clean out. That is one reason why this kind of a furnace to a small gas works is a Godsend. I think we save a great deal by having that kind of a bench, and I want to say that in making mention of the fact in my paper that, unless the bench were worked up to its full capacity, the idea of its using so much less coke would not hold good, is nothing against the bench, because from my experience it shows a great saving over the old style of furnace. Charging our furnace twice or three times in four hours, it has to remain 10 or 12 hours without anything at all in it.

Mr. Jones—May I ask Mr. Petch what would be the life of a retort, handling it as he does, banking every night? How long would the bench last?

Mr. Petch—The last one lasted 4 years and 3 months. The one we use now has been in use 3 years and 2 months.

Mr. Jones—And is still in good condition?

Mr. Petch—In fair condition.

The President—One thing I will mention in relation to regenerative firing that does not appear in this experience is, in order to watch the process of combustion, I drilled a hole under one of the front slides, thinking that by looking in it through an isinglass disc I could notice that peculiar bright zone which occurs from the combustion of the gases. The disc got broken, and as I did not see fit to repair it, I had the opening closed. In opening it again under favorable conditions of the fire the full size of the blue flame would come out, under which conditions our heats would travel up. Then we watched the length of that blue flame coming up through the hole, to control our heat, and it was quite a safety valve. It was, as I called it, our thermometer, and when the blue flame would decrease in length our heats were going down, and when it would increase in length our heats were travelling up. Mr. Weber and Mr. Russell are present. Could they, from their experience throughout the country, state what might possibly be the life of retorts? They need not particularize on benches, but simply refer to the matter of the relation to the life of retorts in regenerative firing.

Mr. Russell—We generally figure on what we get out of the retort. We figure that we get from 7½ to 8 millions, and whether you get that out in two or three years makes very little difference. The retort usually produces that much gas. In 36 months, where there are very high heats, that is considered extraordinary; and these vary from about 27 to 36 months, depending very much on the care which has been taken of them by the people operating them. It does not seem to make very much difference whether the retort is larger or smaller, as regards the life.

The President—It is well to have it understood, in making reports about the length of life of benches, the statement that should be considered is the yield per mouthpiece.

On motion of Mr. Steinmann a vote of thanks was tendered Mr. Converse for his paper.

The President introduced Mr. Daniel R. Russell, of St. Louis, Mo., who read the following paper on

RECUPERATOR BENCHES FOR COKE AND COAL FIRING.

Mr. President and Gentlemen of the Pacific Coast Gas Association: I felt great hesitancy in undertaking to prepare a paper on this subject to be read before your honorable body, knowing the difficulties I would encounter, owing to the diverse conditions existing on the Pacific Coast from those of the field in which I have been working. The differences in climate with the effect therefrom on gas consumption, and in the quality of coal and the coke produced from, in the cost of the former and the value of the latter on the market, and many other variations, make it exceedingly difficult to harmonize my experience with these conditions. I have, however, endeavored to fit them together and adjust them, so as to set forth the advantages of recuperator benches for coke and coal firing on the Pacific Coast. I must, therefore, beg for indulgence if any inaccuracies occur in my presentation of this subject for your consideration.

A number of most excellent papers on full-depth and semi-recuperator benches have been read before the American and Western Gas Associations, both as to coke and coal firing—notably, papers by Messrs. Fred Bredel, Oscar Weber, W. H. Odiorne and E. G. Pratt; but I believe that no paper has heretofore been presented on this topic before this Association, and, as the conditions are so dissimilar, I concluded that possibly this theme might be of interest to the members.

I am indebted to several of my friends on the Pacific Coast and in other parts of the country, for information and data whereby I have been enabled to prepare this paper, and I desire to express my appreciation of their kindness.

In construction, to secure the proper depth of furnace and recuperation for the ordinary or standard semi-recuperator bench built by most contractors, about 5 feet to 6 feet from the inside of the bottom retort to the top of the ashpan would be required. The width of the arch should be, if possible, not less than 7 feet, preferably 8 feet. However, it is sometimes possible to install recuperator benches in old arches of less dimensions, depending entirely on their condition as to stability and construction.

It is advisable to have all flues for waste gases from the furnace so arranged that each may be reached without difficulty from the front and easily cleaned, particularly where coal is to be used as fuel in the furnace, otherwise the flues are apt to soot up and cause difficulty in maintaining proper heats. Great care should be taken to have all joints carefully covered and tight, to prevent leakage from air to gas flues. The air flues should be so arranged that the air is broken up into small areas or thin strata, to insure heating to a high degree. These flues, however, must be arranged to allow for a total area sufficient to permit the proper amount of air to pass through them slowly. It is also necessary to have a good draft on the bench in order to obtain proper combustion and the best results in working.

The ashpan and grate should be about 1 foot 6 inches wide, by about 5 feet long, and, if the arch will permit, the furnace should be widened above that point. The lower, or furnace, door, is kept tightly closed by a breast and cotter bar, and the furnace is fed through a filling door placed above the floor.

A system of water pans is arranged in step fashion, at the front of the furnace just behind the furnace door, and a small stream of water, introduced through a pipe in the lintel, drops from water pan to water pan and into the ash pan, which has an overflow pipe. With some grades of fuel it is found advisable to introduce a jet of steam under the grate bars.

In arranging for semi-recuperator benches it is necessary to have sufficient depth of furnace to be able to carry at all times over 2 feet of incandescent fuel. To accomplish this a height of 5 feet from the grate bars to the bottom of the bottom retorts is necessary, as it is impossible to fill the furnace full at all times, and allowance must be made for the fuel burning down.

The recuperation should extend down as far as possible, preferably to the top of the foundation, which is generally considered the top of the ash pan, this being usually set in the foundation. If, however, the bench is to be set in an old arch, and it is found impossible to underpin the side, party and back walls, owing to their shaky condition or other cause, the center may be dug out to allow the deep furnace, and a system of flues with less recuperation constructed. Such benches have given fairly good results; but, of course, not equal to the standard bench.

It is necessary to construct pits in front of these benches, which it is desirable to have about 9 feet wide, and not less than 4 feet deep. The floor plates in front of the bench should be so arranged that they can be pulled back to allow the stoker to descend into the pit to clinker and take out the ashes. If possible, it is preferable to have the pit 6 feet or 7 feet deep, to give headroom for the men, and arranged to enable them to enter the pit by a stairway at the end of the stack of benches. It is found that the heat in these pits is not excessive, and, by removing one

or more plates, circulation of the air is obtained while the men are at work, making it comparatively comfortable even in hot weather.

For full depth recuperator benches the same general description, as to arrangement of furnace, doors, grate, etc., will apply; but, of course, the furnaces are deeper and larger, and the recuperation is much more extensive. Those having full depth benches are familiar with their construction and requirements, and those contemplating their erection must consider new retort house, stage floor, coal elevation, etc., besides the construction of the benches.

Opinions differ as to the best system to install, whether semi or full depth recuperators. Of course, this depends upon the output and the conditions surrounding each individual plant. The results obtained from semi-recuperators would tend to confirm the belief that they are preferable to full depth benches of 6's, unless the plant is so situated that great economy can be accomplished in bringing in coal and removing coke. Where full depth benches are desirable, it is the general belief that 9's are decidedly preferable, as they are more economical to work, both in fuel and labor, and the cost of construction is much less per mouthpiece, and, consequently, per 1,000 feet capacity.

Many forms of recuperator benches are in use, and while, of course, the best results are secured where a very deep body of fuel, and also a deep and extensive recuperation, can be obtained, as in full depth recuperator benches, still the excellent results secured from semi-recuperator benches, and the possibility of placing them in the ordinary retort house, and, in many cases, in arches originally built for free-fire benches, have made this form very popular.

I have endeavored to explain the conditions requisite for the installation of semi-recuperator benches, so that anyone contemplating their adoption could decide if o'd arches could be utilized or the retort house arranged for new arches and benches.

If the benches are properly constructed on the lines set forth, it will be found that the results claimed for them can be obtained, and that, when the stokers have become used to handling them, their labor in working these furnaces is greatly diminished. The clinkering is in no wise the severe work required in the ordinary free-fire bench. It will be found that it is merely necessary to shake up the bars and take out the ashes, withdrawing the fire once a week, and thoroughly cleaning off the clinkers which may have formed. This is the practice followed in the Middle and Eastern States with the coals used there, and there is no reason to believe that the cokes produced from coals used on the Pacific Coast require any greater amount of labor.

Where coal is used for fuel in the furnace it is necessary to remove the ashes more frequently and to clean out the furnace thoroughly about twice a week. It is usual to fire once a week (usually Sunday) with coke instead of coal, to burn off all accumulated soot and clear up the flues and ducts.

In operating the benches a low degree of heat should be maintained in the furnace, by not admitting sufficient primary air under the grate bars to cause complete combustion at this point. Sufficient depth of fuel (say not less than 2 feet) must always be maintained, so that carbonic oxide will be generated. This comes in contact with the secondary air, which makes its exit from the air flues immediately under the bottom retorts and results in practically complete combustion, producing intense heat. The products of combustion pass around the retorts, down through a system of heat flues, and thence into the vertical flues or chimney. Both primary and secondary air is heated by passing through a system of flues in close proximity to the waste heat flues.

When clinkering a set of supplementary bars is pushed in over the top water pan, forced back through the fuel, the bars resting on a set-off in the brickwork at the back of the furnace. The lower bars are then withdrawn and the clinker removed. When they are replaced the supplementary bars are withdrawn and the body of hot fuel falls to the regular bars. The water dripping on the water plates keeps the furnace cool at the bottom and largely prevents clinker. When the fuel is disposed to produce an extraordinary amount of clinker, steam may be introduced to destroy it.

The following table sets forth the comparative results of ordinary and recuperator benches, with annual outputs of from 8,400,000 to 67,200,000 cubic feet of gas, and shows the carbonization of coal, the amount of fuel required in the furnaces, the annual saving where coke is used for fuel, and also the greater saving where coal is used.

These results are figured on a coal producing 4.85 feet of 16-candle power gas to the pound, and which will average, in coke produced, about 60 per cent. in weight of the coal carbonized, which grade of coal I learn is generally used on the Coast. In the table the long ton is used for all calculations.

I understand that coal is purchased almost exclusively by the long ton, and that coke is sold in the same way, so this measure is used as a standard in these calculations. I also understand that coke is ordinarily sold at from $8 to $15 per ton, and I have adopted the lesser figure, as it is probably a fair average, presuming that in many places a much less price must be accepted.

From information received, I believe that probably the best fuel to be used, other than coke, would be a mixture of, say, South Prairie, Franklin or some other coal of this grade, with lignite screenings. This grade of coal being worth, I understand, $4.50 per ton, and the screenings $3 per ton, the average price of the mixture would be $3.75 per ton, and I have based my estimates on this cost.

In the table showing fuel consumption I have adopted the percentage

Annual Output of Gas, in Cubic Feet.	Daily Average Output.		Coal Carbonized, in Tons per Annum.	Coke Produced, in Tons per Annum.	Ordinary Free-Fire Benches.		Semi-Recuperator Benches.		Annual Saving in Coke, in Tons, by Using Semi-Recuperator Furnaces.	Value of Coke Saved, per Ton.	Amount Received per Annum for Sale of Coke Saved in Semi-Recuperator Benches.	Amount of Coke Used in Furnaces, Semi-Recuperator Benches, per Ann'm	Value of Coke Used Semi-Recuperator Furnaces, per Annum, at $8 per Ton.	Am't Coal, in Tons, Used in Semi-Recuperator Furnaces, per Ann'm in Lieu of Coke.	Value of Coal Used in Semi-Recuperator Furnaces, per Annum, at $3.75 per Ton	Saving per Annum by Using Coal in Semi-Recuperator Furnaces, in Lieu of Coke.
	Maximum.	Minimum.			Coke Used in Furnace & Wasted, 50 per Ct.	Coke Left for Sale, 50 per Ct.	Coke Used in Furnace & Wasted, 80 per Ct.	Coke Left for Sale, 70 per Ct.								
8,400,000	30,000	15,000	773	463	231	231	139	324	92	$8.00	$736.00	139	$1,112.00	193	$723.75	$388.25
16,800,000	60,000	30,000	1,546	926	463	463	278	648	185	8.00	1,480.00	278	2,224.00	386	1,447.50	776.50
33,600,000	120,000	60,000	3,092	1,852	926	926	556	1,296	370	8.00	2,960.00	556	4,448.00	773	2,898.75	1,549.25
67,200,000	240,000	120,000	6,184	3,704	1,852	1,852	1,112	2,592	740	8.00	5,920.00	1,112	8,896.00	1,546	5,797.50	3,098.50
Full Recuperators (9's)					Coke Used in Furnace & Wasted, 50 per Ct	Coke Left for Sale, 50 per Ct.	Coke Used in Furnace & Wasted, 20 per Ct.	Coke Left for Sale, 80 per Ct.								
67,200,000	240,000	120,000	6,184	3,704	1,852	1,852	741	2,963	1,110	8.00	8,880.00	741	5,928.00	680	2,550.00	3,378.00

of coke made, in preference to the percentage of the weight of coke per 100 pounds of coal carbonized, believing that it is a simpler method of figuring for practical purposes.

From experience in the section east of the Rocky Mountains, and from information regarding your coals, I am satisfied you can count on producing from 50,000 to 55,000 cubic feet of gas per bench of 6's in 24 hours, using not more than 30 per cent. of the coke made for fuel, in semi-recuperator, and from 90,000 to 95,000 cubic feet of gas per bench of 9's, with a consumption of not more than 20 per cent. of the coke made, in full depth recuperator furnaces.

I have endeavored to prepare this table in such form that anyone, taking into consideration the local conditions applying, could figure out what his saving would be.

I have found that in semi-recuperator benches from 20 to 35 pounds of coal in the furnace are required to carbonize 100 pounds in the retorts. Where a good mixture is used, however, it can be safely calculated that 25 pounds in the furnace will carbonize 100 pounds of coal in semi recuperator, and that 11 pounds will do the work in full depth benches, and I have used these figures in the table.

I have avoided extending the amounts in decimals or fractions so as to simplify calculations.

To recapitulate, you will see that, with an output of 8,400,000 cubic feet, the annual saving, by the operation of semi-recuperator instead of free fire benches, firing coke in the furnaces, would amount to $736, and if coal is used there would be a further saving of $388.25, making a total of $1,124.25 gained by the operation of semi-recuperator, coal firing benches, as compared with ordinary free fire benches.

With an output of 16,800,000, the saving with coke firing would be $1,480, and the additional saving by coal firing would be $776.50, or a total of $2,256.50.

With an output of 33,600,000, the saving with coke firing would be $2,960; additional saving by coal firing, $1,549.25; total, $4,509.25.

With an output of 67,200,000, the saving with coke firing would be $5,920; additional saving by coal firing, $3,098.50; total, $9,018.50.

With an output of 67,200,000, where full depth recuperator benches of 9's are used, the saving with coke firing would be $8,880, the additional saving by coal firing, $3,378; total, $12,258.

For an output of 8,400,000 feet I think the installation of one semi-recuperator bench of 4's and one bench of 3's would be preferable.

For 16,800,000 feet, one bench of 6's and one bench of 4's; for 33,600,000 feet, two benches of 6's and one bench of 4's; for 67,200,000 feet, five benches of 6's, or three benches of full-depth recuperator 9's.

The benches of 4's would be installed in arches constructed for benches of 6's, the ashpan, etc., being raised about 2 feet, and the bottom of the arch filled in with common brick, which could be removed at some future time, and a bench of 5's substituted, if desired.

Where the output exceeds 67,200,000 feet, full-depth benches of 9's are far and away more economical, and the results can be estimated from the figures given in this table.

I have not estimated the saving in labor in using semi or full depth benches, as compared with those with free fire furnaces. In small plants, of course, it would amount to nothing, excepting in the greater convenience for the men. In large plants, however, this saving would be very considerable. As I do not know the rate of wages paid on the Coast, and had not sufficient time to gather all this data, I was obliged to omit this item from my calculations.

Discussion.

The President—This is a most interesting subject to us all. That coal could be used alone, or in conjunction with coke, as a matter of economy, is quite a piece of information to us on this Coast. If anyone here has had experience in the matter of firing with coal in regenerative furnaces, we would be pleased to hear from them. Mr. Gregory, have you ever tried it?

Mr. Gregory—No; we use coke all the time.

The Secretary—While I have had no experience with full or half depth furnaces, I have had practice in burning coal under open settings. During the last year, when coke realized a price as high as $1 per barrel, we saved enough to make the coal that we were burning under our retorts cost us but $2 a ton. At the present time, when coke is a drug on the market, owing to the importation of the English article, there would scarcely be any economy, I imagine, in the use of coal under ordinary furnaces. It seems to me to depend largely in that matter upon the market for coke. Here, where ships come with anything for a cargo ballast they can pick up, to take back cargoes of wheat, we sometimes have to compete with this imported coke at a very low price. We have also been threatened by the importation of coal tar from England, at prices which we simply could not afford to meet. I see now in the daily prints that we will have a tariff of 67 cents on all coals imported into California, a raise of 27 cents on bituminous and of 67 cents upon Welsh anthracite—another handicap to the poor gas man on this Coast, whose fuel price has always been too high, and where, if ever protection on that point were needed, it is with us.

Mr. Jones—Mr. Russell, what has been your experience in handling settings of 9's? Do you find that the bottom retort gives out much earlier than the others, and what means do you take to protect it?

Mr. Russell—In a good many instances the middle bottom retort in a bench of 9's gives out first. The principal cause of that failure is the benches in many instances were built too narrow. The furnace gases pass up through the furnace arch and come in contact of course with the heated air just above that point. In most instances those retorts are pretty close together, in some instances as close as 7 inches, and from that up to 12 inches. When you get below 11 or 12 inches you so crowd the space that the gases, which become ignited there, cannot pass away freely, and an intense heat is generated. This is a kind of a blowpipe action which causes the destruction of the middle bottom retort. The side retorts give down also towards the center, but where you have arches sufficiently wide in which to put large retorts, and still have sufficient space, we find very little trouble. Of course, in constructing such benches care should be taken to use the very best material procurable for the tiles placed at that point. In some instances trouble comes from the bottom retort going down, owing to the fact that the furnace arch would give out; but that was the fault of the people operating them, in permitting the secondary air to get above the furnace arch to produce combustion; that is, where the benches were not constructed properly. If you have enough coke in the furnace to produce carbonic oxide, or admit so much primary air as to get combustion in the air, you have the same results as you would have where the ports of the retorts are close together. In other words, you get direct combustion in your furnace, and if the ports are not sufficiently large to permit combustion to escape freely, the very finest bench will be spoiled in six or eight days.

The President—You had some experience in that line, Mr. Jackson.

Mr. Jackson—Yes, sir. We used coal when the price of coke was so high that we wanted to save all we could, and we obtained very good results. We used Wallsend coal at the time, but at the present time we are using coke.

The President—Do you use Wallsend in connection with steam?

Mr. Jackson—No, sir.

The President—Did you find the sooting up of the flues to interfere with it?

Mr. Jackson—No; we had no trouble whatever.

The President—Considerable smoke issued out of the stack, I presume?

Mr. Jackson—Yes, sir.

The President—Our first experience in lighting up regenerative benches was both experimental and curious. I wanted to provide myself with every possible means in case that anything happened to go wrong on account of our ignorance. We prepared a bench with a tar burner to use up any residual we could not sell, and we did it with the burner lengthened out about 3 feet so as to go to the back wall, and we found our greatest trouble was to keep the heat down. The heat would be high enough to slough the brick work. Our object was of course to save coke and supply up our consumers' demand. We then tried Wallsend, but the smoke was so great in the stack we thought the best thing to do was to try our tar burner again (tar with steam), and we had the same trouble that we had before. The coal would generate too great a heat, so we abandoned it and went back to coke. I was very much pleased to hear Mr. Russell's remarks in that regard.

On motion a vote of thanks was tendered Mr. Russell for his very able paper.

On motion, the Association was declared adjourned, to reassemble at 10 A.M. the following day.

[To be Continued.]

Prepayment Meters.

[A paper, by MR. THOMAS WILSON, of Coatbridge, Scotland, read before the North British Association of Gas Managers.]

I have not hitherto taken up much of the time of these meetings in reading papers, for the simple reason that I had nothing new to offer. I am much in the same position to-day, but I thought it might possibly interest some of the members of the Association were I to give my ex-

perience with prepayment meters, and an account of the success which has attended their introduction in Coatbridge. When these meters were first brought out I was rather sceptical as to the chances of their finding general favor with the consumers, thinking that the trouble entailed by the necessity of having to continuously drop in pence would be a serious objection. I was very much pressed, however, by some of our Scotch meter makers to give them a trial, which I ultimately did close upon three years ago.

My first aim was to secure, not only a meter of good quality, but also one having as simple and perfect an automatic arrangement as possible. Having obtained samples from a number of meter makers, and discovered which, in my opinion, were the best and most suitable, I ordered a small number to begin with. These were no sooner in our hands than they were fixed for consumers; with the result that in a very short space of time the demand was so great that we could not get delivery of them from the makers quick enough. Since then, and up till now, the demand has continued. At present there are over 1,200 in use, which means, seeing that our total number of consumers is 5,368, that we have 22 per cent. of them using prepayment meters. I may also say here that in Coatbridge mostly all the meters in use are tin-cased drys; the automatics are wholly 2-light tin-cased drys. In all cases meters are fixed free, and no meter hire is charged. We have not, as yet, had a single application for any larger sized prepayment meter.

For security we take from ordinary consumers deposits ranging from $1.25, and on all deposits amounting to $2.50 or upwards 5 per cent. interest is paid; and a large number of householders in our district were unwilling to pay these deposits, and consequently used oil instead of gas. But there being no necessity to insist on deposits in the case of prepayment consumers, we supplied them with meters quite unconditionally; and we have all along found that neither the meter nor the cash has been tampered with in any way.

Most of the houses in Coatbridge are supplied with gas fittings, so that our district was one well suited for the introduction of the prepayment meter. We had a few meters sent us at the start that did not give us the satisfaction we should have liked, but these were returned to the makers, and we have now little or no trouble with those in use. Our inspectors take the indices and collect the cash quarterly, and they invariably find the amount in the box to correspond with the indices; and while on survey they can overtake as many as from 60 to 80 per day, according to the nature of the district.

The meters were set at first to pass 20 cubic feet per hour, an extra charge of 20 cents per 1,000 cubic feet being made to cover interest on the larger capital outlay on the meter, as compared with the ordinary ones. The consumption by prepayment consumers has, however, so far exceeded our expectations, ranging, as it did in one year, from 6,000 to 12,000 cubic feet, that quite recently my directors, when reducing the price of gas to ordinary consumers to 62 cents per 1,000 cubic feet, thought themselves warranted in only charging 10 cents more per 1,000 cubic feet to automatic consumers, instead of 20 cents as at first. As a consequence, we are now charging only 72 cents per 1,000 cubic feet, which we feel assured will yield a very good margin of profit. Taking the case of the smallest automatic consumer, burning only 6,000 cubic feet, this extra 10 cents will yield 62 cents, which is equal to 12½ per cent. on the extra cost of the automatic meter, as compared with the ordinary one. In addition to this there is the profit on the increased sales of gas, which, in our case, is never less than 12 cents per 1,000 cubic feet.

Instead of incurring the trouble and expense of readjusting the meters when reductions in price are made, we have adopted a system of returning the difference between the price when the meters were first set and the reduced price. This system of refunding has a very agreeable effect on the consumer, who looks upon the 31 cents per 1,000 cubic feet consumed, the amount at present refunded, as a sort of dividend worth looking forward to; and instead of the orthodox grumble as to overcharged bills, we have often expressions of pleasure and satisfaction awarded our inspectors on their welcome visits. We, of course, intimate to these consumers, through the press and by our inspectors, the amount which will be refunded on any alteration taking place in the price.

From my experience with these meters I do not hesitate in the slightest in recommending their introduction on an extended scale in any town, as by their means the industrial classes, who have hitherto been more or less partial to oil, are reached; convinced, as they are, that they are now cheaper with gas. The result is that a considerable increase of revenue is derived by the gas manufacturer, through the wider use of gas as an illuminant, and otherwise, which accrues from this rather novel, though, in my opinion, perfectly practicable method of supplying the same.

Although this paper does not contain sufficient matter for discussion, I will be pleased to answer any question which may suggest itself to the members present.

ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Messrs. Riter & Conley, of Pittsburgh, Pa., have been awarded the contract for the new holder to be added to the plant of the Manitoba Electric and Gas Light Company, of Manitoba, Winnipeg. This holder, which is to rest in a steel tank, the dimension of which is to be 97 feet diameter by 23 feet deep, is to be of the double lift order, and is rated to store 300,000 cubic feet. The corporation name of the Manitoba Company is evidently an example of the "cart before the horse," since it is pretty near to the truth to say that the Company's main earning power comes from the gaseous division of the enterprise.

Mr. A. E. Hammond, for many years Superintendent of the Amesbury and Salisbury (Mass.) Gas Company, has resigned. A live successor could work no stay to the Company's development.

The work of adjusting the street gas lamps purchased by the authorities of Williamstown, Mass., is well underway.

We regret to report the death of Mr. James Simmons, for a long time prominently identified with the affairs of the Nashville (Tenn.) Gas Company, whose summons came on the evening of Wednesday, the 11th inst. Mr. Simmons was born in Kilrush, Clare county, Ireland, March 8, 1825. He emigrated to North America, landing in Quebec, Canada, in 1848, from whence he made his way to New York. Shortly thereafter a business opportunity which promised well induced him to remove to Cincinnati, O., where he resided until 1862, that year marking his removal to Nashville, in which place the rest of his busy, honest life was spent. Besides his interest in the Nashville Gas Company, of which corporation he was second Vice President, and a member of the Board of Directors as well, he was a moving spirit in the Nashville Trust Company and in the Merchants Bank, of Nashville.

At a special meeting of the Board of Directors of the Nashville (Tenn.) Gas Company, called to take suitable action respecting the death of Mr. James Simmons, the following minute to his memory was adopted:

"At a meeting of the Directors of the Nashville Gas Company the following was ordered spread on the minutes of the Board, and it was directed that a copy of the same be sent to the family of the late Mr. James Simmons:

"Mr. James Simmons, whose death is so generally mourned, was for many years an active member of this Board, and the successful management of the affairs of the Company is due in a great measure to his wise counsel and clear judgment. He filled with eminent ability various positions of like character to that held by him in this Company; and in every one his course was marked by a conservative and wise judgment. Filling, as he did, conspicuous places that gave evidence of the great confidence reposed in him by his co-workers, yet in all his bearing was that of the modest and retiring gentleman.

"He never sought those places of trust and confidence, but his high and spotless character, together with his well-known conservative judgment, made him sought after; this alone being the best testimony as to the esteem in which he was held.

"This estimate was not confined to his business associates, but was shared in by all his friends and acquaintances.

"Unassuming and modest, he was greatly loved by his friends, and he had in marked degree the esteem and respect of all his fellow citizens.

"His success in life, due to his rugged honesty and the strict observance of the right in all things, teaches a lesson fit to be learned by all.

"His life is ended, and a review of it now makes prominent his high character. Nashville has lost a prominent citizen.

"M. W. Brown,
"M. M. Gardner, } Committee."

The town of Methuen, Mass., has determined to replace a number of arc electric lamps with burners of the Welsbach type, so far as the illumination of its streets is concerned.

THE annual report of the Superintendent of Lamps, Washington, D. C., has been submitted to the Commissioners of the District. In it the Commissioner asserts, that the change ordered by Congress, by means of which the rate of gas consumption in the public lamps was reduced from 6 to 5 cubic feet per hour, does not seem to have been advantageous. To use the words of the Superintendent, "Although a corresponding reduction of 50 cents per lamp per year was made in the maximum price, the service was not improved"—an admission that rather goes to show that the more gas consumed the better the light afforded. It might be well to say here that when the rate of consumption was ordered cut down, Congress also directed that the moon table schedule should be superseded by an all night and every night table. The Superintendent admits, however, that with a few minor exceptions, the gas lighting service has been well maintained throughout the year. The Inspector had this to say further about street lighting by gas in Welsbach burners: "It is urgently recommended that Congress be requested to set aside about $2,000 or $3,000 of the street lighting fund to be expended by the Commissioners for experimental lighting, with a view of improving and increasing the efficiency of the service. Under the present law, which fixes the consumption of gas lamps at 5 cubic feet per hour, Welsbach or other improved burners cannot be used. Welsbach lights are meeting with favor in many large cities, where they give a splendid service. In Washington they would be of great value in lighting those residence streets traversed by street railway lines, since considerable objection has been raised to the introduction of arc lamps in such sections. Welsbach burners consume less gas and give more light than the ordinary burner. They are, however, more expensive to maintain, it being impossible to operate them at the maximum price of $20 per lamp per annum fixed by the appropriation act. For this reason, and because they do not burn 5 cubic feet, they have not been introduced. Were this special provision made in the law such lamps could be tried, and if proved satisfactory could be provided for permanently."

OTHER points in the report of the Inspector (we take it for granted that all our readers know that Mr. S. Calvert Ford is the official gas examiner for the District of Columbia), are: During the year the average candle value of the gas supplied by the Washington Gas Light Company was 25.84; although on seven occasions the tests showed that the gas was somewhat below the standard. During the year, 3,636 gas meters were inspected and proved, of which number 135 were fast, with an average error of 4.54 per cent.; 635 registered slow, with an average error of 10.76 per cent.; 2,595 registered within the limits allowed by law, 2 per cent. either way; and 260 did not register the gas passing through them. For this inspection service $1,245.30 was collected by Mr. Ford, and by him remitted to the Collector of Taxes. Under the circumstances, considering that Mr. Ford tested 3,636 meters in the twelvemonth, it looks fair that his demand for an assistant inspector should be favorably, and forthwith, considered.

MR. D. F. BURRITT, Manager of the Company, informs us that the Rockville Gas and Electric Company, is no longer in any way connected with the Rockville and Ellington Street Railway Company, of Rockville, Conn., the railway portion of the former Company's franchise having been surrendered. The Rockville Gas and Electric Company very wisely has concluded to develop the gas supply of Rockville and Ellington, and to compass that end Manager Burritt has mapped out and is carrying on a sensible system of main extension.

AT the annual meeting of the Consolidated Gas, Electric Light, Heat and Power Company, of Newburgh, N.Y., the officers chosen were: President, B. B. Odell, Jr.; Vice-President, Alfred Bridgeman; Secretary, C. L. Waring; Treasurer, C. J. Goodrich. This concern proposes to supply steam heat in Newburgh from a central station; but man proposes and the sheriff disposes.

THE authorities of Grand Rapids, Mich., have determined to test the applicability and value of Welsbach lamps for outdoor illumination. The scheme includes the placing of 30 lamps at points where their efficiency will be thoroughly tested.

THE Safety Car Heating and Lighting Company will erect a plant, on the Pintsch system, at Mobile, Ala., for the manufacture of compressed oil gas wherewith to illuminate the passenger coaches of the Mobile and Ohio Railroad.

THE Town Council, of Montclair, N. J., has instructed the Clerk to ask the proprietors of the Montclair Gas and Water Company to reduce the rate for gas supplied to the public buildings to $1.50 per 1,000 cubic feet. The present gross rate is $2.10; prompt payment insuring to the user a rebate of 10 cents per 1,000.

THE proprietors of the Citizens Gas Light Company, of Willimantic, Conn., in consideration of the valuable and effective service rendered by the local fire department during the recent fire at the Company's works, presented the fire laddies with a check for $100.

THE Trustees of Port Richmond, N. Y., have revoked and annulled the franchise granted some years ago to the projectors of the Consumers Gas Company.

EARLY this month a stroke of lightning connected with the roof of Christ Episcopal Church, Burlington, Iowa. In its travels the current fractured a gas pipe and ignited the gas, which blazed undetected through the night, the church having been closed for the summer. The break was at a point not far from the organ loft, and the stone wall at the back of the instrument was almost at a dull red heat before the sexton next morning luckily discovered how things were going. It may be taken for granted that the gas supply was speedily shut off.

THE plant of the Middletown (Ohio) Gas Company was sold at assignees' sale about a fortnight ago. The nominal purchaser was Mr. Paul J. Sorg, at his bid of $33,000.

MESSRS. RICH AND AIKEN, acting as attorneys for the plaintiff, in the case of Carl Armbruster against the Auburn (N. Y.) Gas Light Company, under which plaintiff recovered $2,000 for damages done to plants in his greenhouses, through gas that entered therein from a leak in defendant's street main, have agreed to accept $1,500 in full settlement of the award.

The City Council, of Corvallis, Oregon, has granted a franchise to Mr. J. H. Wilson, for the operation there of a gas plant. The place is too small and too unimportant to support profitably such an undertaking.

SOME dissatisfaction has been expressed over the manner in which the property of the Fulton and Oswego Falls (N. Y.) Gas Company has been acquired by the new owners.

ACCORDING to the annual report of the Directors of the Ottawa (Can.) Gas Company, for the twelvemonth ended March 31st, 1897, the Company seems to have had a prosperous year. The report states:

"Your Directors, in presenting the annual report of the Company for the year ending 31st March, 1897, have pleasure in submitting for your consideration statements of assets and liabilities and of revenue and expenditure—accounts which show that the business for the year has been satisfactory, considering the reduction in consumption by the Dominion government buildings, also in price of fuel gas to $1 net, and the increased price of oil for manufacture. The profit for the year ending 31st March, 1896, was $26,140.45, and for the year ending 31st March, 1897, $28,043.48, showing an increase of $1,903.03, which, after deducting the interest on bonds ($4,866.64), leaves a profit, net, of $23,176.84 available for distribution, out of which the Directors propose to pay a dividend of 7 per cent., and carry the balance forward. The new telescopic gasholder and house for same (referred to in last year's report) have, in the opinion of the Directors, been completed in such a manner and such a price as to reflect very great credit on the contractors, engineer and superintendent. The expectations of your Directors, as to oil becoming much cheaper, have unfortunately not yet been realized—it is still 25 per cent. higher than when oil manufacture was commenced—and they have in contemplation the manufacture of a portion of gas out of bituminous coal. This, if carried out, will, they estimate, decrease the cost of manufacture, as well as provide a standby in case of trouble with oil contractors. Wellington, Bank, Metcalfe and Queen streets will require new mains and services. It is probable, therefore, that a limited amount of new stock or debentures will be issued at an early date, for which due notice will be given. Your Directors, at the request of a number of shareholders, have, after due consideration, decided to apply for the necessary power to convert the present par value of the shares from $20 to $100 each, which will be more convenient if found more desirable to have them quoted on the market. Since last report 217 meters have been added, making a total of 798 lighting and 632 fuel.—JOHN COATES, President."

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHAS. E. SANDERSON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 32 Pine Street, New York.

The JOURNAL is the official organ of the
NEW ENGLAND ASSOCIATION OF GAS ENGINEERS.
AMERICAN GAS LIGHT ASSOCIATION.
WESTERN GAS ASSOCIATION.
OHIO GAS LIGHT ASSOCIATION.
PACIFIC COAST GAS ASSOCIATION.
TEXAS GAS AND ELECTRIC LIGHT ASSOCIATION.

TERMS:

SUBSCRIPTION—Three Dollars per annum, in advance. Single copies, 10 Cents.

AGENTS:

New York—American News Co., 39 and 41 Chambers St.
Germany—Lemcke & Buechner, of New York.
England—Aug. Siegle, 30 Lime Street, London.

MONDAY, AUGUST 23, 1897.

Imported Carbons and the Manufacturers' Opportunity.

In editorial comment on this subject *Electrical Age* says:

The high duty imposed upon imported arc carbons should serve as an incentive to American manufacturers to enter actively into the field of competition and make carbons whose qualities and service will equal the best of foreign products. At present the rate is 90 cents per 100, and the duty on pencil carbons alone is equal to the price of good domestic carbons. There is no lack of proper ingredients to be found in the United States, neither is there any reason to suppose that our skill is one whit inferior as manufacturers to that of our friends across the water. Why, then, is no effort made by American manufacturers to produce hard, fine-grained and pure carbons? This question might best be answered by saying, they have made the attempt, but remained content to turn out an inferior grade, because they could not get a fair price for their goods. In the use of inclosed and alternating arc lamps, the employment of hard, fine grained carbons is imperative. Every day the demand for imported carbons is increasing. Before the present rate of 90 cents per 100 was demanded, the old duty of 30 cents, ad valorem, made their introduction an easy matter in American markets. They became a necessity, and it is evident that they will continue so, for the high duty cannot debar their use until an equally good, domestic carbon is manufactured here. There is not a carbon manufacturer in this country that will not, on reading this article, believe it to be in his power to ultimately compete with as fine a grade of carbon as the Nuremburg or Hardmuth. If American persistence and resolution cannot do this we must then acknowledge that our facilities are incomplete. We can make everything required for an electric light plant, but we cannot make good carbons. Let the carbon manufacturers answer this.

The Market for Gas Securities.

The traders were concerned principally last week in the dealings in Consolidated, the extremes being 190½ and 186. To day (Friday) the opening was made at 189½ to 190. On Thursday one lot of investment stock was marketed at a trifle under 190; and those who had held it for such a length of time might better have held on a trifle longer. Standards, both common and preferred, exhibit remarkable strength; the former is quoted to day at 128 bid, with stock offered at 132. Mutual is 272 bid, and the nominal for Equitable is 263 to 265.

Brooklyn Union is again beyond the 120 mark, and Chicago gas is strong, at 102¾ to 103. It is more than likely that an arrangement will be completed in Chicago whereby the Universal, Ogden and Mutual Companies will be taken care of. In that light the shares of the succeeding consolidated Chicago Company should be worth 120. Bay State shows no particular change. Baltimore Consolidated is beyond the 60 point—it is well worth 75; and Columbus (Ohio) gas looks low, even at the ratio quoted, 81 to 83.

Gas Stocks.

Quotations by Cochran & Close, Brokers and Dealers in Gas Stocks.

35 WALL ST., NEW YORK CITY.

AUGUST 23.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share.

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated	$35,430,000	100	189½	190
Central	500,000	50	195	..
" Scrip	220,000	..	100	.
Equitable	4,000,000	100	263	265
Bonds, 6's	1,000,000	1,000	105	..
" 1st Con. 5's	2,300,000	1,000	114	.
Metropolitan Bonds	658,000	..	108	112
Mutual	3,500,000	100	272	277
" Bonds	1,500,000	1,000	100	102
Municipal Bonds	750,000	.	..	.
Northern	150,000	50	85	
" Bonds	150,000	1,000	..	98
New York and East River	5,000,000	100	88½	90
Preferred	2,000,000	100	115	117
Bonds 1st 5's	3,500,000	1,000	112	113
" 1st Con. 5's	1,500,000	..	105	106½
Richmond Co., S. I.	348,650	50	50	..
" Bonds	100,000	1,000	..	..
Standard	5,000,000	100	128	132
Preferred	5,000,000	100	137	142
Bonds, 1st Mortgage, 5's	1,500,000	1,000	114	115
Yonkers	299,650	50	130	
Out-of-Town Companies.				
Brooklyn Union	15,000,000	100	120	120½
" " Bonds (5's)	15 000,000	1,000	113	114½
Bay State	15,000,000	50	1¾	1⅞
" Income Bonds	2,000,000	1,000	..	35
Boston United Gas Co.—				
1s Series S. F. Trust	7,000,000	1,000	90	92
2d " " "	3,000,000	1,000	74	75
Buffalo Mutual	750,000	100	125	..
" Bonds	200,000	1,000	95	100
Central, San Francisco	2,000,000	..	95	..
Chicago Gas Co.	25,000,000	100	102¾	103
Chicago Gas Lt. & Coke Co. Guaranteed Gold Bonds.	7,650,000	1,000	104	104¼
Columbus	1,000,000	.	81	83
1st Mortgage	1,085,000	..	..	96
Consumers. Jersey City	2,000,000	100	73	77
" Bonds	600,000	1,000	101½	103
Cincinnati G. & C. Co.	8,500,000	100	203	203½
Consumers, Toronto	1,600,000	50	184½	187
Capital, Sacramento	500,000	50	..	35
Bonds (6's)	150,000	1,000	..	..
Consolidated, Baltimore	1,000,000	100	60	60½
Mortgage, 6's	3,600,000	..	107	107½
Chesapeake, 1st 6's	1,000,000	..	..	..
Equitable, 1st 6's	910,000	..	..	..
Consolidated, 1st 5's	1,490,000	..	..	..
Detroit	4,000,000	-	32	34
" Con. Bonds	4,312,000	..	85	88½
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	..	101
Fort Wayne	2,000,000	..	88	84
" Bonds	2,000,000	..	93	95
Hartford	750,000	25	..	145
Indianapolis	2,000,000	..	152	155
" Bonds, 6's	2,650,000	..	107	109
Jersey City	750,000	20	180	..
Lafayette Gas Co., Ind.	1,000,000	100	88	89
Bonds	1,000,000	1,000	92	94
Louisville	2,570,000	50	..	..
Laclede, St. Louis	7,500,000	100	39	39½
Preferred	2,500,000	100	90	95
Bonds	9,034,400	1,000	101½	102
Little Falls, N. Y.	50,000	100	..	100
Bonds	25,000	..	..	100
Montreal, Canada	2,000,000	100	200	.
Newark, N. J., Gas Co.	1,000,000	..	142	..
Bonds, 6's	4,000,000	..	123	..
New Haven	1,000,000	25	225	..
Oakland, Cal.	2,000,000	..	53½	54
" Bonds	750,000	..	..	..
Peoples Gas Lt. & Coke Co., Chicago, 1st Mortgage	20,100,00	1,000	..	108
2d "	2,500,000	1,000	104	105
Peoples, Jersey City	500,000	50	..	175
Rochester Gas & Elec. Co.	2,150,000	50	..	..
Preferred	2,150,000	50	83	..
Consolidated 5's	2,000,000		87½	90
San Francisco, Cal.	10.000,000	100	94	94½
St. Paul Gas Light Co.	1,500,000	100	49	51
1st Mortgage, 6's	650,000	..	84	87
Extension, 6's	600,000	..	.	..
General Mortgage, 5's	2,400,000	.	88	90
Syracuse, N. Y.	500,000	25	..	..
Washington, D. C.	2,000,000	20	250	
Western, Milwaukee	4,000,000	100	84	8
Bonds, 5's	3,556,000	.	98	100
Wilmington, Del.	550,000	50	200	202

Advertisers' Index.

GAS ENGINEERS.

	Page
Wm. Henry White, New York City	315
Fred. Bredel, Milwaukee, Wis.	300
Geo. R. Rowland, New York City	315
The Western Gas Construction Co., Fort Wayne, Ind.	306
Humphreys & Glasgow, New York City	302
American Gas Co., Phila., Pa.	300
David Leavitt Hough, New York City	317
Economical Gas Apparatus Construct'n Co., Toronto, Ont.	315

PROCESSES.

Bartlett, Hayward & Co., Baltimore, Md.	313
United Gas Improvement Co., Phila., Pa.	305
Burdett Loomis, Hartford, Conn.	314
National Gas and Water Co., Chicago, Ills.	307
Economical Gas Apparatus Construct'n Co., Toronto, Ont.	315
The Western Gas Construction Co., Fort Wayne, Ind.	306
Humphreys & Glasgow, New York City	302

GAS WORKS APPARATUS AND CONSTRUCTION.

James R. Floyd & Sons, New York City	316
Continental Iron Works, Brooklyn, N. Y.	314
Deily & Fowler, Phila., Pa.	316
Kerr Murray Mfg. Co., Fort Wayne, Ind	312
Stacey Mfg. Co., Cincinnati, Ohio.	315
Bartlett, Hayward & Co., Baltimore, Md.	313
Davis and Farnum Mfg. Co., Waltham, Mass.	312
R. D. Wood & Co., Phila., Pa.	314
Isbell-Porter Company, New York City	314
Fred. Bredel, Milwaukee, Wis.	300
United Gas Improvement Co., Phila., Pa.	305
Berlin Iron Bridge Co., East Berlin, Conn.	302
National Gas and Water Co., Chicago, Ills.	307
Economical Gas Apparatus Construct'n Co., Toronto, Ont.	315
The Western Gas Construction Co., Fort Wayne, Ind.	306
Humphreys & Glasgow, New York City	302
Gas Engineering Co., Pittsburgh, Pa.	312
American Gas Co., Phila., Pa.	300
Logan Iron Works, Brooklyn, N. Y.	316
Riter & Conley, Pittsburgh, Pa.	299

SCRUBBERS AND CONDENSERS.

G. Shepard Page's Sons, New York City	315
R. D. Wood & Co., Phila., Pa.	314
James R. Floyd & Sons, New York City	316
Continental Iron Works, Brooklyn, N. Y.	314
Gas Engineering Co., Pittsburgh, Pa.	312
Logan Iron Works, Brooklyn, N. Y.	316
Riter & Conley, Pittsburgh, Pa.	299
Kirkham, Hulett & Chandler, London, Eng.	299

REGENERATIVE FURNACES.

Bartlett, Hayward & Co., Baltimore, Md.	313
Fred. Bredel, Milwaukee, Wis.	300
J. H. Gautier & Co., Jersey City, N. J.	310
Parker-Russell Mining and Mfg. Co., St. Louis, Mo.	310
Adam Weber New York City	310

TAR AND CARBONIC ACID EXTRACTOR.

G. Shepard Page's Sons, New York City	315
R. D. Wood & Co., Phila., Pa.	314

AMMONIA CONCENTRATORS.

Michigan Ammonia Works, Detroit, Mich..... 297
G. Shepard Page's Sons, New York City..... 315
Gas Engineering Co., Pittsburgh, Pa..... 312

GAS METERS.

John J. Griffin & Co., Phila., Pa..... 320
American Meter Co., New York and Philadelphia..... 319
Helme & McIlhenny, Phila., Pa. 319
D. McDonald & Co., Albany, N.Y..... 319
Nathaniel Tufts, Boston, Mass..... 318
Maryland Meter and Mfg. Co., Baltimore, Md..... 318
Metric Metal Co., Erie, Pa 318
Keystone Meter Co., Royersford, Pa..... 318
Buhl Stamping Company, Detroit, Mich..... 319

PREPAYMENT METERS.

American Meter Co., New York and Philadelphia..... 319
John J. Griffin & Co., Phila., Pa..... 320
D. McDonald & Co., Albany, N. Y..... 319
Helme & McIlhenny, Phila., Pa..... 319

GAS AND WATER PIPES.

Ohio Pipe Co., Columbus, Ohio 317
M. J. Drummond, New York City..... 317
R. D. Wood & Co., Phila., Pa..... 314
Warren Foundry and Machine Co., New York City..... 317
Donaldson Iron Co., Emaus, Pa..... 317

PIPE CUTTERS.

The Anderson Pipe Cutter Co., Marlboro, Mass..... 299

STEAM BLOWER FOR BURNING BREEZE.

H. E. Parson, Brooklyn, N. Y..... 307

GAS COALS.

Penn Gas Coal Co., Phila., Pa..... 309
Perkins & Co., New York City 308
Despard Gas Coal Co., Baltimore, Md..... 309
Westmoreland Coal Co., Phila., Pa..... 309
Berwind-White Coal Mining Co., New York and Phila... 308
Althouse & Kennedy, Phila., Pa..... 309

CANNEL COALS.

Perkins & Co., New York City 308
Althouse & Kennedy, Phila., Pa..... 309

GAS ENRICHERS.

Standard Oil Co., New York City 309
The Sun Oil Co., Pittsburgh, Pa..... 309

COKE.

Pittsburgh Gas and Coke Co., Pittsburgh, Pa..... 297

COKE CRUSHER.

C. M. Keller, Columbus, Ind..... 309

CONVEYING MACHINERY.

C. W. Hunt Company, N. Y. City 298

GAS GAUGES.

The Bristol Co., Waterbury, Conn..... 298

GAS GOVERNORS.

Connelly Iron Sponge and Governor Co., New York City 307
Isbell-Porter Co., New York City..... 314
The Wilder Mfg. Co., Phila., Pa..... 298
R. D. Wood & Co., Phila., Pa..... 314

SELF-SEALING MOUTHPIECE DOORS.

Isbell-Porter Co., New York City..... 314
Continental Iron Works, Brooklyn, N.Y..... 314
G. Shepard Page's Sons, New York City..... 315
Logan Iron Works, Brooklyn, N. Y..... 316
R. D. Wood & Co., Phila., Pa. 314

CEMENTS.

C. L. Gerould & Co., Mount Vernon, N.Y..... 310

RETORTS AND FIREBRICKS.

J. H. Gautier & Co., Jersey City, N. J..... 310
B. Kreischer & Sons, New York City..... 310
Adam Weber, New York City..... 310
Laclede Firebrick Mfg. Co., St. Louis, Mo..... 310
Cyrus Borgner, Phila., Pa..... 310
James Gardner, Jr., Pittsburgh, Pa..... 310
Henry Maurer & Son, New York City..... 310
Baltimore Retort and Firebrick Co., Baltimore, Md..... 310
Parker-Russell Mining and Mfg. Co., St. Louis, Mo..... 310
Brooklyn Firebrick Works, Brooklyn, N. Y..... 310
F. Behrend, New York City..... 299

INCANDESCENT GAS LAMPS.

Welsbach Commercial Co., Phila., Pa..... 304

THORIUM.

The Roessler & Hasslacher Chemical Co., N.Y. City..... 297

MICA GOODS.

The Mica Mfg. Co., New York City..... 297

BURNERS.

C. A. Gefrorer, Phila., Pa..... 314
Theo. Clough, Dobbs Ferry, N. Y..... 297
Wm. M. Crane & Co., New York City 298

LAVA GAS TIPS.

D. M. Steward Mfg. Co., Chattanooga, Tenn. 298

GAS BAGS.

Peerless Rubber Mfg. Co., New York City..... 297

PURIFYING MATERIALS.

Connelly Iron Sponge and Governor Co., New York City 307
Greenpoint Chemical Works, Brooklyn, N.Y..... 307
Henry W. Douglas, Ann Arbor, Mich 307

EXHAUSTERS.

The P. H. & F. M. Roots Co., Connersville, Ind 301
Isbell-Porter Company, New York City..... 314
Connelly Iron Sponge and Governor Co., New York City 307

VALVES.

Ludlow Valve Manufacturing Co., Troy, N. Y. 306
Chapman Valve Manufacturing Co., Boston, Mass..... 306
R. D. Wood & Co., Phila., Pa..... 314
Continental Iron Works, Brooklyn, N. Y..... 314
The P. H. & F. M. Roots Co., Connersville, Ind..... 301
Isbell-Porter Co., New York City..... 314
The Western Gas Construction Co., Fort Wayne, Ind.... 306

ELECTRICAL APPARATUS.

Wm. Henry White, New York City 315

GAS ENGINES.

Otto Gas Engine Works, Phila., Pa..... 280
The American Gas Engine Co., Phila., Pa..... 311
Backus Water Motor Co., Newark, N. J..... 257

ENGINES AND BOILERS.

The Hazelton Boiler Company, New York City..... 297
W. G. & G. Greenfield, East Newark, N. J..... 258

PURIFIER SCREENS.

John Cabot, New York City..... 298

GAS STOVES.

American Meter Co., New York and Philadelphia..... 303
Maryland Meter and Manufacturing Co., Baltimore, Md. 318
Keystone Meter Co., Royersford, Pa..... 318
Wm. M. Crane & Co., New York City..... 298

GASHOLDER TANKS.

J. P. Whittier, Brooklyn, N. Y 306

GASHOLDERS.

Bartlett, Hayward & Co., Baltimore, Md..... 313
Continental Iron Works, Brooklyn, N. Y..... 314
Deily & Fowler, Philadelphia, Pa..... 316
Davis & Farnum Mfg. Co., Waltham, Mass..... 312
Kerr Murray Mfg. Co., Fort Wayne, Ind..... 312
Stacey Mfg. Co., Cincinnati, Ohio..... 315
R. D. Wood & Co., Philadelphia, Pa..... 314
Logan Iron Works, Brooklyn, N. Y..... 316
Riter & Conley, Pittsburgh, Pa..... 299

GAS SECURITIES.

Marquand & Parmly, New York City..... 297

BOOKS, ETC.

Scientific Books..... 317
Field's Analysis..... 308
Digest of Gas Cases..... 309
Directory of Gas Companies..... 317
Practical Photometry..... 310
Coal Tar Genealogical Tree..... 308
Management of Small Gas Works 302
Handbook on Gas Engines..... 313
Gas Flow Computers 299
Hughes' "Gas Works"..... 307

DIVIDEND NOTICE.

OFFICE OF WELSBACH COMMERCIAL COMPANY,
40 WALL ST., NEW YORK CITY, August 12, 1897.

The Directors have this day declared a quarterly dividend of two (2) per cent. on the preferred stock, payable Sept. 10, 1897, to stockholders of record at the close of business Aug. 31. Transfer books of the preferred stock will be closed from Sept. 1 to Sept. 10, both inclusive. Checks will be mailed

1159-3 EDWARD C. LEE, Treasurer.

WANTED,

Superintendent for Gas, Electric Light and Street Railroad Company.

A thoroughly competent man needed. Essential that he be a good mechanic and able manager. Address, with references and salary required, "UNITED SYSTEM,"

1159-1 Care this Journal.

Situation Wanted

With a Gas or Construction Company,

By an experienced Engineer in construction and the manufacture of water gas. Seven years with the United Gas Improvement Company; 2½ years with the Economical Gas Apparatus Construction Company, in Canada and England.

C. D. BARDALL, 347 Wyoming Street,

1157—1159 Pittston, Pa.

POSITION WANTED.

Graduate M.E., 27 years of age, desires engagement as Superintendent of Gas (Coal or Water) or Gas and Electric Light Works. Laboratory work and draughting a specialty.

Address "ENGINEER,"

1158-tf Care this Journal.

Position Wanted.

A young, active man wants the management of a gas property, or the position of Assistant Superintendent at a gas or electric plant. Address

1157-tf "G. F. S.," care this Journal.

Position Desired

As Superintendent of Gas Works,

by a thoroughly competent man.

1157-tf Address "W.," care this Journal.

Position Desired

As Superintendent of Gas Works or Gas and Electric Light Works,

By a man 34 years of age. Sixteen years' experience in the manufacture and distribution of Coal Gas as Supt., and four years in the Electric line. Thoroughly competent to take charge of any plant, separately or combined. A practical mechanic, and understands the erection of gas plants and everything pertaining to the business. Not afraid of work. Salary no object until ability is proven. Best of references.

1102-tf Address "M. E. J.," care this Journal.

FOR SALE,

Four Car Loads of Coal Tar,

By the

RICHMOND WATER AND LIGHT CO.,

1158-2 Richmond, Ky.

FOR SALE.

Hydraulic, Dip, Branch and Ascension Pipes, Mouthpieces and Lids, for four Benches of 5's and for one Bench of 3 retorts.

Two Coolers, or Air Condensers, each of 150'000 cubic feet capacity.

Multitubular Condenser, shell, 36 in. diameter, with 98 2-in. tubes, 10 ft. 6 in. long.

D-Shaped Tar Extractor, 8 ft. long, 1 ft. 6 in. deep.

Scrubber, 48 in. diameter, 11 ft. 9 in. high. Three man holes, 11 in. by 15 in.

S-inch Center Seal. Four Purifiers, 8 ft. x 6 ft.

KEY CITY GAS CO.,

1119-tf Dubuque, Iowa.

For Sale.

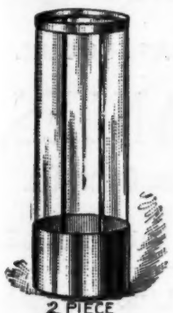
A Small Gas and Electric Light Plant,

in a Southern city of 3,800 inhabitants.

Address FORT WAYNE ELECTRIC CORPORATION,

1097-tf Fort Wayne, Ind.

Our Mica Chimneys



Etched Chimneys to Order.

For Welsbach Lights

ARE THE

BEST IN THE WORLD.

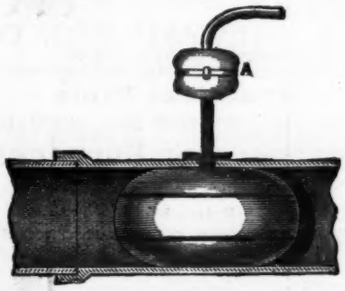
Get Catalog and Discounts.

The MICA MFG. CO

Micasmiths,

88 Fulton Street, N. Y. City.

Peerless Patent Improved Gas Bag



These Gas Bags are used to stop the flow of gas while repairing or making alterations in gas mains. There have been numerous cases of workmen being badly injured, and sometimes fatally, by the escape of gas resulting from the bursting of a bag, and our patent improvement is designed to obviate such calamities. The indicator *A* shows unerringly when the bag has been sufficiently inflated to pack the main, and when the pumping should be stopped. Our Bags are made of a rubber stock especially prepared to admit of great distension, and to resist the action of Oils, Gases, Naphtha and other residuum in the mains, and they are made with lapped joints, which adds greatly to their strength.

3-in. Gas Bag, each,	$0.60		12-in. Gas Bag, each,		$5.00
4 " " "	.80		16 " " "		8.25
5 " " "	1.05		20 " " "		12.00
6 " " "	1.75		24 " " "		17.00
8 " " "	2.65		30 " " "		27.50
10 " " "	3.75				

The Peerless Rubber Mfg. Co.

16 Warren St., N. Y. City.

THE Pittsburgh Gas & Coke Co.

MANUFACTURERS OF

Otto-Hoffmann Retort Oven

COKE,

Coarse or Fine, Hard or Soft.

AN IDEAL COKE FOR WATER GAS.

Works on Monongahela River.
Shipping Facilities by River and Rail.

Sales Office, 311 Lewis Bldg., PITTSBURGH, PA.

MARQUAND & PARMLY,

160 Broadway, New York.

Members New York Stock Exchange.

Utilize Your Gas Liquor.
NO EXTRA LABOR OR OPERATING EXPENSES.

Ammonia Concentrator.

Not Expensive. Write to STROH & OSIUS, Pat'ees, or Mich. Ammonia Works, Detroit, Mich.

THEO. CLOUGH,

(Established 1870.)

SOLE MANUFACTURER OF THE

Trade Mark Reg. **Maxim & Clough** Trade Mark Reg. **Adjustable Gas Burners**

E. H. Nickel Tips for Water Gas a Specialty.

THEO. CLOUGH, - - Dobbs Ferry, N. Y.

The Gas Engineer's Laboratory Handbook.

BY JOHN HORNBY, F.I.C. Price, $2.50.

A. M. CALLENDER & CO., 32 PINE ST., N. Y. CITY.

SELF-LIGHTING

Incandescent Gas Light

AT LAST!

It seems impossible, but it is a fact.

No matches! No electricity! No by-pass!

Active, responsible Agents wanted in all parts of the United States.

For particulars, address:

THE AMERICAN LIGHT CO.,

206-208 Broadway, New York.

HEADQUARTERS FOR

THORIUM

The Roessler & Hasslacher Chemical Co.,

100 WILLIAM STREET, NEW YORK.

The Pioneer Vertical Water-Tube Boiler of the World!

THE HAZELTON OR PORCUPINE BOILER.

After Sixteen Years of Active Service in all the Principal Industries, this Boiler has Proven Itself Superior to all Others in Economy of Fuel, Durability, Safety and General Efficiency.

NO EXPLOSIONS OR ACCIDENTS OF ANY KIND.

Correspondence Solicited.

The HAZELTON BOILER COMPANY,

Sole Proprietors and Manufacturers,

Cable Address, "Paila," New York. Tele., "1229-18th St.," New York. **Gen'l Office, 716 E. 13th St., N.Y., U.S.A.**

BRAY'S BURNERS

Are Suitable for All Pressures and Conditions, and for Efficiency, Economy and Durability are Unrivaled.

Producing a steady, well-shaped flame with burner cock turned on full. Prevent waste of gas, broken globes and dissatisfied consumers.

As Sole Agents in the United States for GEORGE BRAY & Co., we carry a full stock of all sizes for High and Low Pressures. Send for Prices and Special Pamphlet, or order a sample gross, stating your average house pressure.

Every Burner is stamped with name and trade mark. Cheap and inferior imitations are constantly coming in and going out of use, and we respectfully warn the trade against this kind of deception, as it causes loss and discredit to the trade and damage to the gas industry.

SEND FOR CATALOGUE. **SEND FOR CATALOGUE.**

Gas Logs, Fires, Heaters,

OF ALL KINDS.

GAS CONTROLLERS,
GAS FURNACES,
and everything pertaining to the use of Gas.

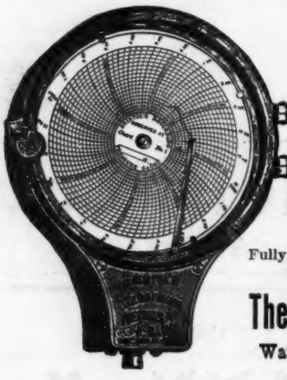
GAS RANGES,

Broilers, Griddles, Ovens, Etc.

Gas Kilns for China.

Special Line of
Gas Appliances for Hotels.

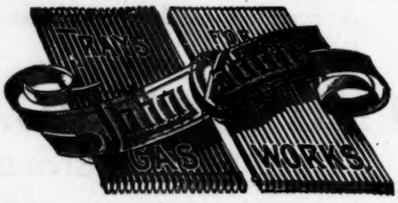
WILLIAM M. CRANE & CO., Mf s.. Factory, 447 to 453 W. 14th St., Office, 838 Broadway. **NEW YORK CITY.**



BRISTOL'S RECORDING
PRESSURE GAUGE.
For continuous records of **Street Gas Pressure**
Simple in Construction, Accurate in Operation Low in Price.
Fully Guaranteed. Send for Circulars.

The Bristol Co.,
Waterbury, Conn.

Special Trays for Iron Sponge or Oxide of Iron,
CHURCH'S TRAYS a Specialty.
Reversible, Strongest, Most Durable, Most Easily Repaired.



553-557 West Thirty-third Street, New York.
We also make the Cheapest and Strongest
REVERSIBLE BOLTED TRAYS IN THE MARKET.
Send for Circulars.

Patent Lava Gas Tips.

UNIFORMITY GUARANTEED.
ALL SIZES AND SHAPES.

D. M. STEWARD MFG. CO.,
CHATTANOOGA, TENN.

Practical Hints
ON THE CONSTRUCTION AND WORKING OF
Regenerator Furnaces,
By MAURICE GRAHAM, C.E.
Price, $1.25.
A. M. CALLENDER & CO., 32 Pine Street, N. Y.

THE GREATEST IMPROVEMENT IN GAS LIGHTING
Has been made by
WILDER'S VOLUMETRIC GOVERNORS.
They control the pressure at the burner, and deliver the quantity for which they are set regardless of high or low pressure in the supply.
WELSBACH LIGHTS are fully controlled, and the governors soon pay for themselves by preventing the breaking of mantles and chimneys. Thousands are already in use. Orders may be given to the Welsbach Co., or sent to ourselves.
THE WILDER MANFG. CO., - - 818 Cherry St., PHILADELPHIA.

C. W. HUNT COMPANY.

No. 958 Copyright, 1895, by C. W. Hunt Co.

COKE CARS for Gas Works,
TIP CARS for Carrying Ashes,
CHARGING CARS for Bringing Coal from the Storage Bins to Boiler Room and Retort Houses.

INDUSTRIAL RAILWAYS
Specially designed for handling material in and around
Gas Works, Coal Yards, Factories, Etc., Etc.
Before you forget it, send for a copy of our new, 40-page, illustrated Catalogue, No. 9703, fully describing this Industrial Railway.

45 Broadway, N. Y. City.

BINDER for the JOURNAL

STRONG.
DURABLE.
LIGHT.
SIMPLE
CHEAP.
HANDSOME.
Price, $1.
A.M. Callender & Co.,
32 Pine st.,
N. Y. City

THE Patent "Standard" Washer-Scrubber

(U. S. A. Patent, No. 486,927 of November 29, 1892.)

As in use in most of the principal Gas Works in Great Britain and on the Continent of Europe.

THE FOLLOWING ARE SAMPLES OF TESTIMONIALS RECEIVED, VIZ.:

From MR. A. C. McMINN, Engineer at Kensal Green Station of The Gas Light and Coke Co.

"I have had No 2 Washer at work and find it as satisfactory as No. 1. I am sending to-day certificate for final payment."

From MR. W. R. CHESTER, Engineer to the Nottingham Corporation.

"The Washer fitted at Basford last year with your new Patent Wood Segments, works well, and I am quite satisfied with it. I propose to have each vessel converted to wood segments, as the iron ones wear out."

FOR PARTICULARS AND ESTIMATES APPLY TO

KIRKHAM, HULETT & CHANDLER, Limited,

PALACE CHAMBERS, WESTMINSTER, ENGLAND.

RITER & CONLEY, PITTSBURGH, PA.

GASHOLDERS, with or without Steel Tanks.

Purifiers, Condensers, Scrubbers, Oil Tanks, Smoke Stacks.

STEEL ROOFS and BUILDINGS.

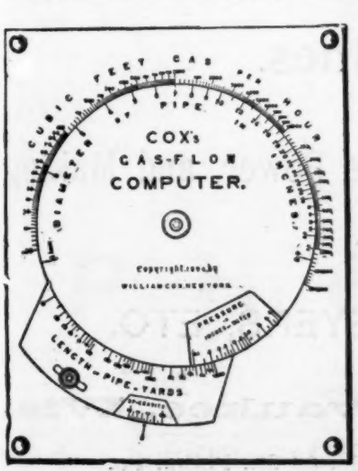
PLATE AND STRUCTURAL WORK OF EVERY DESCRIPTION.

THE ANDERSON Patent Cutter Carrying Link
Made in all sizes.

Will cut from 2 in. to 24 in.
Pipe Cutting Tool

For Cutting Cast, Wrought Iron, Gas & Water Pipes.
THE ANDERSON PIPE CUTTER COMPANY, Manufacturers,
293 Lincoln St., Marlboro, Mass.
N. Y. Office, 135 Greenwich St
C. H. TUCKER, JR., Manager.
WALDO BROS.,
102 Milk Street, Boston, Mass.

F. BEHREND,
SOLE IMPORTER OF THE CELEBRATED
German (Stettin-Didier) Clay Gas Retorts,
BLOCKS, TILES, FIREBRICKS, FIRE CEMENT,
Stettin "Anchor" & "Eagle" Brand Portland Cement
10 & 12 Old Slip New York.



Cox's Gas Flow Computer.

1. It gives at a glance the discharge of gas from pipes 1 to 48 inches in diameter and 10 to 10,000 yds. long, for any pressure from 0.01 to 10.0 inches of water, and any specific gravity from 0.40 to 1.00.
2. When the required discharge and the length of pipe are given, the diameter corresponding to any pressure is at once seen.
3. When the required discharge and the length of pipe are given, the pressure corresponding to any diameter is at once found.
4. Any suitable combination of the different factors of any problem, under all possible conditions, may be immediately found.

It Prevents Errors and Saves Hours of Tiresome Calculations.

Price, $5.00, per Registered Mail.

For sale by

A. M. CALLENDER & CO., 32 Pine St., N. Y. City.

AMERICAN GAS COMPANY

Owns, Operates, Buys and Leases Gas Works.

Undertakes all Kinds of Construction Work, Especially for the Manufacture of Gas from Caking Coal.

EASTERN AGENTS FOR

FRED. BREDEL'S SYSTEM
COAL GAS PLANTS AND GAS APPARATUS.

P. H. & F. M. ROOTS CO.'S
Exhausters, Blowers, etc.

Recuperative Furnaces, Washers, Condensers, Purifiers and Purifying Machines, Ammonia Plant, Coke Conveyers, etc.

APPARATUS BY WHICH COAL GAS CAN BE BROUGHT UP TO 22 or 24 CANDLE POWER, MAKING A WHITE LIGHT THAT WILL BURN WITHOUT SMOKING.

222 South Third Street, Philadelphia, Pa.

GEORGE G. RAMSDELL, General Manager. Correspondence Solicited

FRED. BREDEL, C.E.

Coal and Water Gas Plants,

OWN SYSTEM.

Recuperative Furnaces, Washers, Condensers, Purifiers, Purifying Machines.

Gas Enriching Plants to Enrich Coal Gas up to 24 Candle Power, and Making a White, Bright, Non-smoking Gas.

COMPLETE GAS WORKS, COKE CONVEYERS, ETC.

No. 118 Farwell Avenue, · · Milwaukee, Wis.

Eastern Agents: AMERICAN GAS CO., Construction Department, 222 So. 3d St., Phila., Pa.

P. H. & F. M. ROOTS CO.

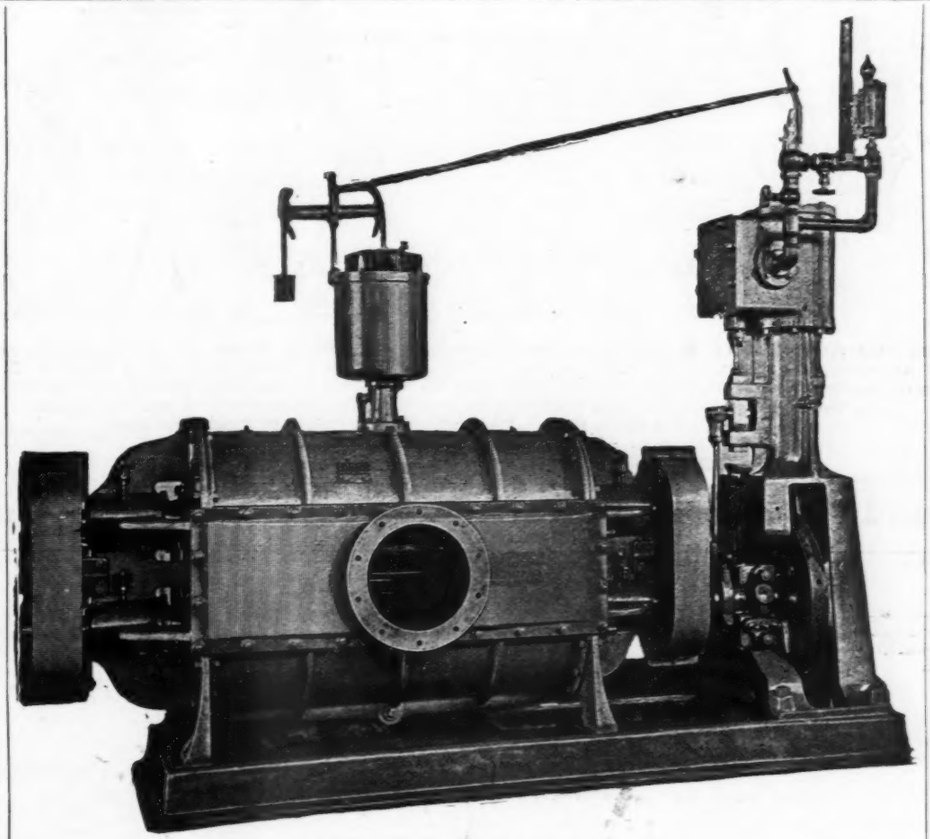
Beg to announce they have completed arrangements by which the

AMERICAN GAS COMPANY,

222 SOUTH THIRD STREET, - PHILADELPHIA, PA.,

Become their Eastern Agents, and will have exclusive control of the territory, embracing New York, New Jersey, Pennsylvania and New England, for the sale of Exhausters and kindred machinery. The New York Office will be continued for the sale of the ROOTS' BLOWER.

New Design of Direct Connected Engine and Exhauster on Same Bedplate.



This Design is Used for all Exhausters from No. 7 to No. 10 Inclusive.

Write for Illustrated Catalogue.
Estimates submitted on application.

P. H. & F. M. ROOTS CO.

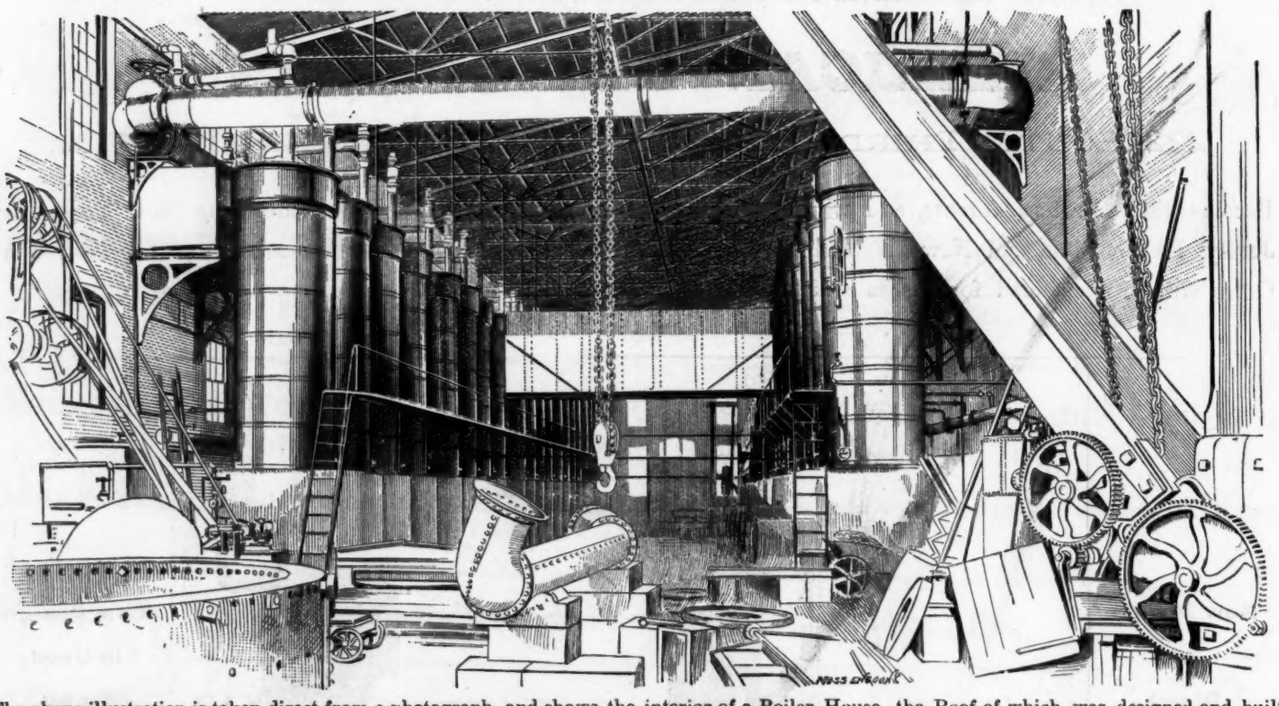
Connersville- Indiana.

New York Office, 109 Liberty Street. J. B. STEWART. Manager

CHAS. M. JARVIS, President. B"RR K. FIELD, Vice-President. GEO. H. SAGE, Secretary. FRANK L. WILCOX. Treasurer.

THE BERLIN IRON BRIDGE CO.

Engineers, Architects, and Builders of Iron and Steel Structures.



The above illustration is taken direct from a photograph, and shows the interior of a Boiler House, the Roof of which was designed and built by us for the Amoskeag Manufacturing Company, at Manchester, N. H. The building is 75 feet in width by 275 feet in length, the walls being made of brick and the roof being made of iron—iron trusses, iron purlins, and covered with corrugated iron—so that there is absolutely no woodwork anywhere about the building which can take fire. For Boiler Rooms this construction particularly commends itself.

Write for Illustrated Catalogue.

Office and Works, No. 6 Railroad Avenue, East Berlin, Conn.

ALEX. C. HUMPHREYS, M. I. C.,
BANK OF COMMERCE BUILDING,
(31 NASSAU STREET.)
NEW YORK.

CABLE ADDRESS,
LONDON & NEW YORK,
"HUMGLAS."

ARTHUR G. GLASGOW, M.E.,
9 VICTORIA ST.,
LONDON, S. W.,
ENGLAND.

HUMPHREYS & GLASGOW,

CONTRACTING AND CONSULTING

GAS ENGINEERS.

WATER GAS PLANT A SPECIALTY.
GAS PROPERTIES EXAMINED AND VALUED.
ADVICE AS TO IMPROVEMENT OF GAS PROPERTIES AND MANAGEMENT.

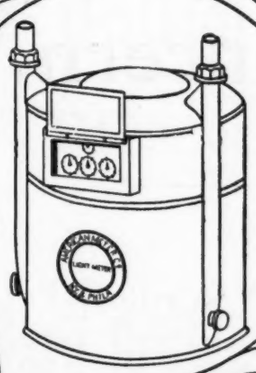
THE MANAGEMENT OF SMALL GAS WORKS.

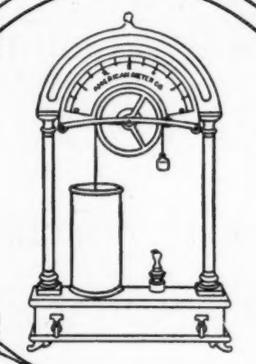
By C. J. R. HUMPHREYS.

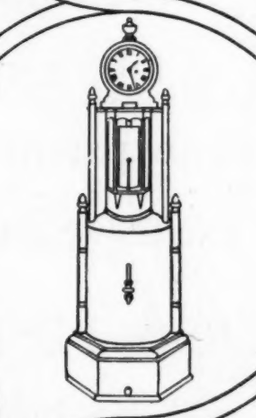
Price $1.

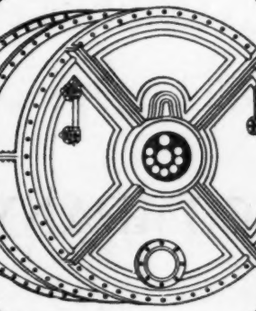
A. M. CALLENDER & CO., No. 32 Pine Street New York.

(Copyrighted, 1894, by the AMERICAN METER Co.









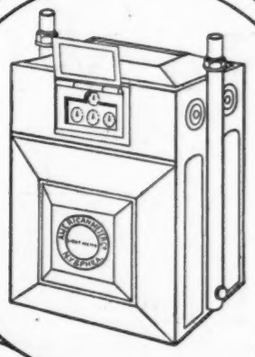
AMERICAN METER CO.

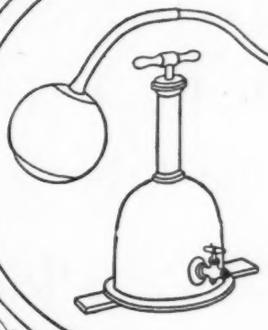
ESTABLISHED 1834. INCORPORATED 1863.

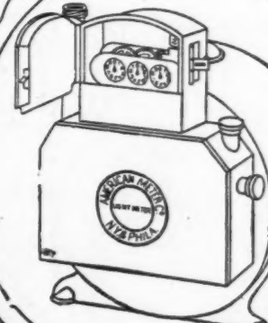
NEW YORK AND PHILADELPHIA,

CHICAGO, ST. LOUIS,

SAN FRANCISCO.







PUBLIC LIGHTING TABLE.

SEPTEMBER, 1897.

Day of Week.	Date.	Table No. 1. Following the Moon. Light.	Table No. 1. Following the Moon. Extinguish.	Table No. 2. New York City. All Night Lighting. Light.	Table No. 2. New York City. All Night Lighting. Extinguish.
				P.M.	A.M.
Wed.	1	7.40 PM	4.30 AM	6.30	4.20
Thu.	2	8.20	4.30	6.30	4.20
Fri.	3	9 10 FQ	4.30	6.15	4.30
Sat.	4	10.20	4.30	6.15	4.30
Sun.	5	11.20	4 30	6.15	4.30
Mon.	6	12.40 AM	4.30	6.15	4.30
Tue.	7	1.50	4.30	6.15	4.30
Wed.	8	3.00	4.30	6.15	4.30
Thu.	9	No L.	No L.	6.15	4.30
Fri.	10	No L. FM	No L.	6.05	4.40
Sat.	11	No L.	No L.	6.05	4.40
Sun.	12	6 40 PM	7.40 PM	6.05	4.40
Mon.	13	6.40	8.00	6.05	4.40
Tue.	14	6.40	8.30	6.05	4.40
Wed.	15	6.40	9.00	6.05	4.40
Thu.	16	6.40	9.40	6.05	4.40
Fri.	17	6.40	10.20	5.55	4.50
Sat.	18	6.40 LQ	11.10	5.55	4.50
Sun.	19	6.30	12.10 AM	5.55	4.50
Mon.	20	6.30	1.10	5.55	4.50
Tue.	21	6.30	2.20	5.55	4.50
Wed.	22	6.30	3.20	5.55	4.50
Thu.	23	6.30	4.50	5.55	4.50
Fri.	24	6.30	4.50	5.40	5.00
Sat.	25	6.30	4.50	5.40	5.00
Sun.	26	6.20 NM	5.00	5.40	5.00
Mon.	27	6.20	5.00	5.40	5.00
Tue.	28	6.20	5.00	5.40	5.00
Wed.	29	6.20	5.00	5.40	5.00
Thu.	30	6.20	5.00	5.40	5.00

TOTAL HOURS LIGHTING DURING 1897.

By Table No. 1.	Hrs. Min.	By Table No. 2.	Hrs. Min.
January	233.00	January	423.20
February	187.20	February	355 25
March	202.00	March	355.35
April	170.40	April	298.50
May	163.00	May	264.50
June	140.40	June	234.25
July	151.40	July	243.45
August	167.30	August	280.25
September	174.40	September	321.15
October	200.00	October	374.30
November	205.20	November	401.40
December	220.10	December	433.45
Total, yr.	2216.00	Total, yr.	3987.45

To Whom It May Concern.

WE have learned that the makers of the "Sunlight" lamp assert that there has been a decision in the English Courts which saves them and their customers from liability as infringers of the Welsbach patents.

We assure the public there is no decision of any Court, in England or elsewhere, that directly or indirectly warrants the statement or inference that the lamp sold by the Sunlight Incandescent Gas Lamp Company of America is not an infringement of the Welsbach Light as made under the American patents, of which the Welsbach Light Company is sole and exclusive owner.

NOTICE is hereby given to all PURCHASERS and USERS of the so-called "Sunlight" lamp that suits will be brought against them for DAMAGES for INFRINGEMENT of the Letters Patent of the Welsbach Light Company, and will be prosecuted vigorously.

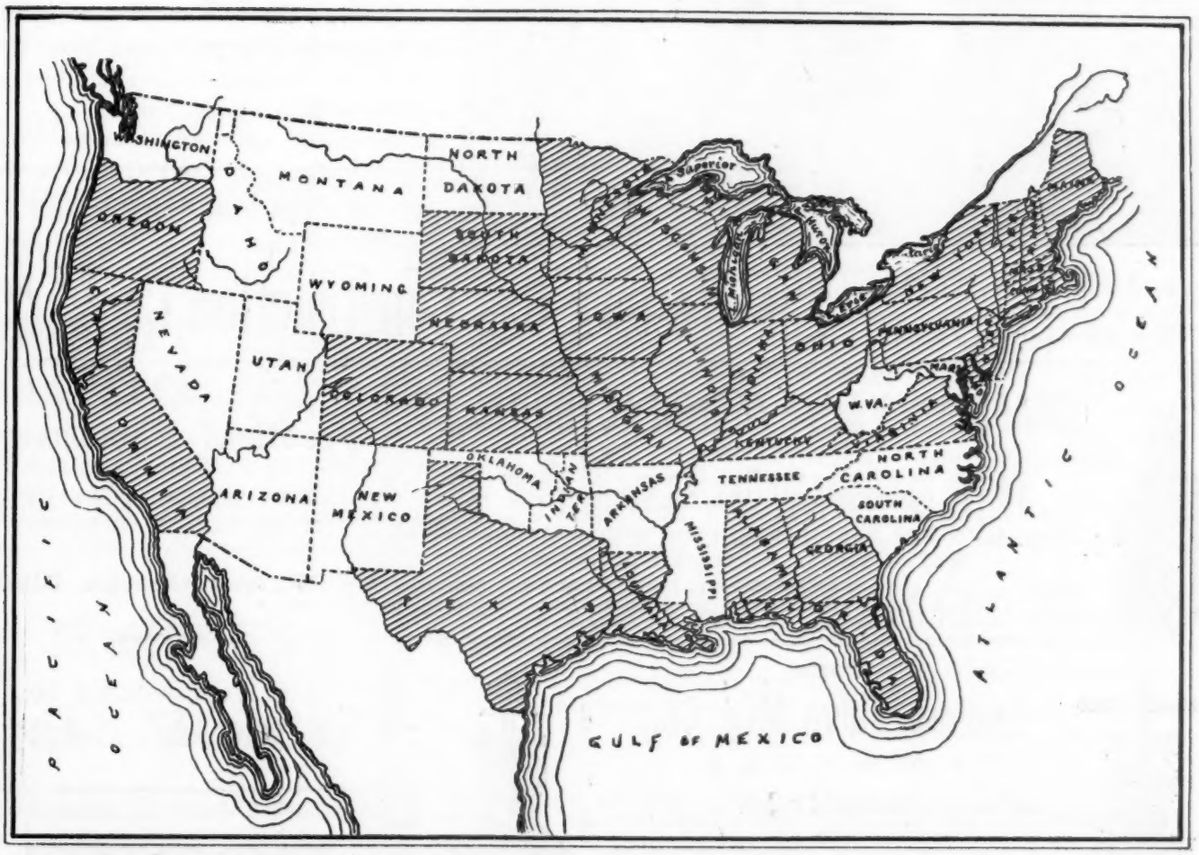
WELSBACH LIGHT COMPANY.

The United Gas Improvement Company,

DREXEL BUILDING, PHILA., PA.

Originators and Builders of the

Standard Double Superheater Lowe Water Gas Apparatus.



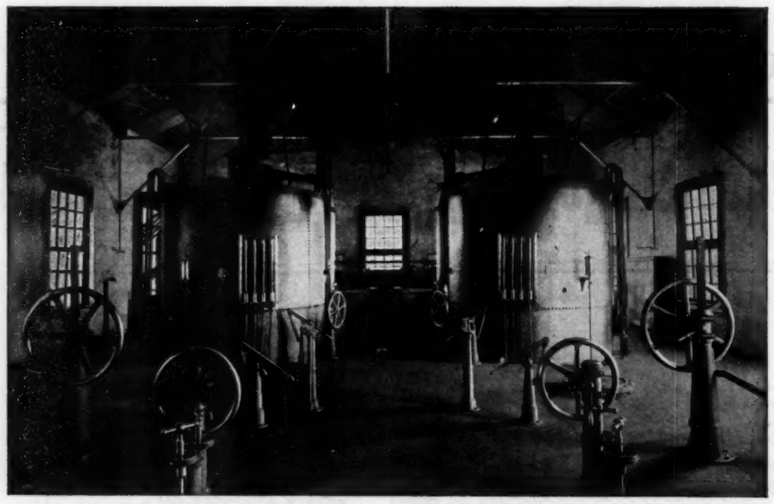
SHADING INDICATES STATES IN WHICH HAVE BEEN BUILT THE STANDARD DOUBLE SUPERHEATER AND JUNIOR LOWE WATER GAS APPARATUS.

UPWARDS OF 215 SETS INSTALLED TO JANUARY 1, 1897.
ELEVEN PLANTS NOW IN PROCESS OF CONSTRUCTION.

Builders, Lessees and Purchasers of Gas Works.

Pamphlets, Plans and Estimates Furnished.

Selected Over All Competitors



by

The Milwaukee Gas Light Company

in February, 1896.

2,000,000 Cu. Ft. Capacity.

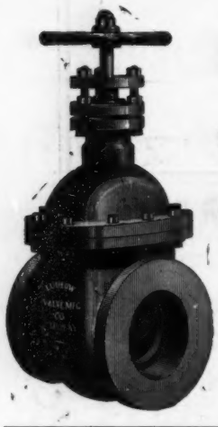
During 11 months' steady operation has been continuously producing better results under all working conditions than were guaranteed in competition.

Our record sells our Apparatus, whether **Water Gas or Coal Gas, Purifers, Valves, Gas Engines,** or anything else we build.

WM. HENRY WHITE,
EASTERN MANAGER,
32 Pine Street, New York.

The Western Gas Construction Co., Fort Wayne, Indiana.

CHAPMAN VALVE MANUFACTURING CO.,
MANUFACTURERS OF
Valves and Gates for Gas, Ammonia, Water, Etc.
Also, Gate Fire Hydrants with and without Independent Nozzle Valve. All Work Guaranteed.
Works & Gen'l Office, Indian Orchard, Mass. Treasurer's Office, 72 Kilby & 112 Milk Sts., Boston, Mass.
Chicago Office, 24 West Lake St. New York Office, 28 Platt St.
St. Louis Office, L. M. Rumsey Mfg. Co., 810 North Second St.



THE
Ludlow Valve Mfg. Co.,
TROY, N. Y., U. S. A.
Double and Single Gate Valves, ¼" to 72
—FOR—
Gas, Water, Steam, Oil, Ammonia, Etc.
HOT GAS VALVES A SPECIALTY.
Send for Catalogue.

GASHOLDER TANKS AND GAS WORKS MASONRY COMPLETE
Plans prepared and Estimates furnished at short notice.
J. P. WHITTIER,
70 Rush St., Near Division Ave., **Brooklyn, N. Y.**

The Gas Engineer's Laboratory Handbook.
By JOHN HORNBY, F.I.C.
Price, $2.50.
A. M. CALLENDER & CO., 32 Pine Street, N.Y. City

Practical Photometry.
A GUIDE TO THE STUDY OF THE MEASUREMENT OF LIGHT.
By William Joseph Dibdin.
Price, $3.00.
A. M. CALLENDER & CO.,
32 Pine Street, N. Y. City.

BOOKS.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR.
By GEORGE LUNGE. Price $12.50.

TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS.
By DAVID A. GRAHAM. 8vo., Cloth. Price $3.
Orders for these books may be sent to this office.
A. M. CALLENDER & CO.,
PINE ST., N. Y. CITY

NATIONAL GAS AND WATER CO.,

218 La Salle Street, Chicago.

Builder and Operator of Gas Works.

The Rew Soft Coal Carbureted Water Gas Apparatus.

TESTED BY THREE YEARS' PRACTICAL OPERATION, AND FULLY GUARANTEED.

Plans and Estimates Upon Application.

IRWIN REW, President and Treasurer. E. E. MORRELL, Engineer.

CONNELLY IRON SPONGE AND GOVERNOR CO.,

(Successors to CONNELLY & CO.)

MANUFACTURERS OF GAS WORKS SPECIALTIES.

"IRON SPONGE." Saves money, saves labor, and is the most efficient purifying material ever offered as a substitute for lime. We guarantee a large saving, both in cost of material and labor.

AUTOMATIC GOVERNOR. OVER FOUR HUNDRED NOW IN USE! NO WORKS COMPLETE WITHOUT IT! WILL PAY FOR ITSELF WITHIN A YEAR! ITS SERVICE SECURES PERFECT DISTRIBUTION! REDUCES LEAKAGE TO MINIMUM, and BENEFITS THE COMPANY and CONSUMER ALIKE! IT IS THE ONLY RECOGNIZED AUTOMATIC GOVERNOR IN THE WORLD!

STEAM JET EXHAUSTER. Designed particularly for small works. Combines Exhaust Tube, Steam Governor, Gas Compensator and Bye-Pass Valves in the most compact form possible. Occupies but little space; uses very little steam; saves formation of carbon in retorts; increases yield 10 to 15 per cent. No works too small to use them profitably.

Prices given on all our specialties, delivered at any point in the United States. Correspondence solicited.

CONNELLY IRON SPONGE AND GOVERNOR CO., No. 357 Canal St., New York.

Hughes'

"Gas Works,"

Their Construction and Arrangement,

And the Manufacture and Distribution of Coal Gas.

Originally written by SAM'L HUGHES, C.E.

Rewritten and Much Enlarged by WM. RICHARDS, C.E.

Eighth Edition, Revised, with Notices of Recent Improvements.

Price, $1.65.

A. M. CALLENDER & CO., 32 Pine St., N. Y. City.

DOUGLAS' FERRIC OXIDE

For Gas Purification

Is a superior natural Hydrated Oxide of Iron. Will give a higher purification per bushel than any other material. We ship the pure Oxide of Iron, containing no sawdust, thus effecting a saving in freight, leaving the consumer to furnish the diluent at a nominal cost. It is now used by the largest gas companies in the West.

Full information, with references to many users, and prices delivered in any locality, furnished on application to

H.W. Douglas (Supt. Ann Arbor Gas Company) Ann Arbor, Mich.

IRON MASS

For Gas Purification.

Acts immediately, and more efficiently than any other purifying agent now in use.

Greenpoint Chemical Works.

JOHN SCHRIEVER, Manager.

Greenpoint Ave. & Newtown Creek, Brooklyn N.Y

Parson's Steam Blower,

FOR IMPROVING BAD DRAUGHT IN BOILERS, AND FOR BURNING BREEZE OR OTHER WASTE MATERIAL.

PARSON'S TAR BURNER.

FOR UTILIZING COAL TAR AS FUEL.

PARSON'S AIR JET TUBE CLEANER.

FOR CLEANING BOILER TUBES.

These devices are all first-class. They will be sent to any responsible party *for trial*. No sale unless satisfactory. Manufactured by the WATERTOWN STEAM BLOWER COMPANY

H. E. PARSON, Supt., 67 Bremen Street, Brooklyn, N. Y.

JAMES D. PERKINS. **PERKINS & CO.,** F. SEAVERNS.

228 and 229 Produce Exchange, New York City.

TIDEWATER SALES AGENTS FOR THE FOLLOWING:

Ocean Mine Youghiogheny Gas Coal.

Clinch Valley, Thacker & Logan Gas Coals

Old Kentucky Shale and O. K. Boghead.

Shipments from New York, Philadelphia, Baltimore and Norfolk.

BERWIND-WHITE COAL MINING COMPANY'S

Ocean Westmoreland Gas Coal.

Offices:
Washington Building, New York.
Betz Building, Philadelphia.

STRICTLY High Grade. . . . .
Carefully prepared.
For Gas Making or
Heavy Steaming.

FIELD'S ANALYSIS

For the Year 1896.

An Analysis of the Accounts of the Principal Gas Undertakings in England, Scotland, and Ireland. Being the Twenty-eighth Year of Publication. Compiled and Arranged by

JOHN W. FIELD, Sec. & Gen. Mangr. of The Gas Lt. & Coke Co., London.

Price, $5. For Sale by

A. M. CALLENDER & CO., - No. 32 Pine Street, N. Y. City.

Coal Tar Genealogical Tree

MR. T. VINER CLARKE, of London, Eng., having compiled a novel Chart or Map illustrating the various

CHEMICAL PRODUCTS DERIVED FROM COAL AND COAL TAR,

in the form of a Genealogical Tree, including all the products discovered to date (the total number amounting to near 700), offers for sale a limited number of copies in Colors, mounted on Linen, with Rollers. Price, $3.50. Orders may be sent to

A. M. CALLENDER & CO., - - No. 32 Pine Street, New York.

GAS ENRICHERS. GAS COALS. GAS COALS.

The Despard Gas Coal Co.,

MINERS AND SHIPPERS OF

DESPARD GAS COAL,

AND MANUFACTURERS OF

COKE.

MINES, - - Clarksburgh, Harrison Co., West Va.
WHARVES, - - - Locust Point, Baltimore, Md.
OFFICE, - 640 Equitable Building, Baltimore, Md.

ROUSSEL & HICKS, 71 Broadway, N. Y. } AGENTS. { BANGS & HORTON, 60 Congress St., Boston.

ALTHOUSE & KENNEDY,

Reading Terminal—Philadelphia.

"Shaner," Westmoreland, Pa.

HIGH GRADE GAS COAL

AND

KENTUCKY CANNELS.

REPRESENTED BY

THOS. N. MORDUE, No. 1 Broadway, N Y

KELLER ADJUSTABLE COKE CRUSHER.

Strong, Simple, Durable. Will Crush any Size Desired.

C. M. KELLER,
Sec. & Supt. Gas Lt. & Coke Co.,
Columbus, Ind.
Correspondence Solicited.

GREENOUGH'S "DIGEST OF GAS CASES."

Price, $5.00.

This is a valuable and important work, a copy of which should be in the possession of every gas company in the country, whether large or small. As a book of reference it will be found invaluable. It is the only work of the kind which has ever been published in this country, and is most complete. Handsomely bound. Orders may be sent to

A. M. CALLENDER & CO., 32 Pine St., N. Y.

— THE —

PENN GAS COAL CO.

OFFER THEIR

Coal, Carefully Screened and Prepared for Gas Purposes.

Their property is located in the Youghiogheny Coal Basin, near Irwin and Penn Stations on the Pennsylvania Railroad, and on the Youghiogheny River.

Principal Office:

Room 720, Reading Terminal Building, Phila., Pa.

Points of Shipment:

Pennsylvania Railroad Piers; Greenwich Wharves, Delaware River; Pier No. 1 (Lower Side), South Amboy, N. J.

EDMUND H. McCULLOUGH, Prest. CHAS. F. GODSHALL, Treas. H. C. ADAMS, Sec.

THE WESTMORELAND COAL CO.

Chartered 1854.

Mines situated on the Pennsylvania and the Baltimore and Ohio Railroads, in Westmoreland County, Pa.

POINTS OF SHIPMENT:

PHILADELPHIA, BALTIMORE, SOUTH AMBOY, N. J.,
WATKINS (SENECA LAKE), N. Y.

Since the commencement of operations by this Company its well-known Coal has been largely used by the Gas Companies of New England and the Middle States, and its character is established as having no superior in gas giving qualities, and in freedom from sulphur and other impurities.

Principal Office, 224 South 3d St., Phila., Pa.

THE SUN OIL CO.,

Crude Oil, Gas Naphtha,
Refined Petroleum, Gas Oil.

Toledo, O., and Pittsburgh, Pa.

Standard Oil Company,

GAS NAPTHA DEPARTMENT.

GAS NAPTHA.

GAS OIL.

Correspondence Solicited.

26 Broadway, New York City.

RETORTS AND FIRE BRICK. RETORTS AND FIRE BRICK. RETORTS AND FIRE BRICK.

Established 1858. Incorporated 1890.
CHAS. E. GREGORY, Prest. DAVID R. DALY, V.-Prest. & Treas.
H. D. ABERNETHY, Sec.

J. H. Gautier & Co.

Greene & Essex Streets,
Jersey City, N. J.

MANUFACTURERS OF

CLAY GAS RETORTS, FIRE CLAY TILES,
FIRE BRICK and FIRE CLAY SPECIALTIES.

Ground Fire Clay, Fire Sand and Ground Fire Brick in Barrels and Bulk.

SOLE MANUFACTURERS OF THE

FLEMMING GENERATOR GAS FURNACE

Brooklyn Fire Brick Works,

MANUFACTURERS OF

CLAY RETORTS, FIRE BRICK,
Gas House and other Tile.

Office, 88 Van Dyke St., Brooklyn, N. Y.

Established 1854. Incorporated 1869.

LACLEDE
Fire Brick Manufg. Co.,

Manufacturers of { GAS RETORTS . .
FIRE BRICK . . .
RETORT SETTINGS

Water Gas Cupola Linings, Fire Clay, Etc.

Exclusive Agents for

The Mitchell Half-Depth Regenerative Furnace.

This is the *original* coal-consuming Furnace for Retort Benches. Burns either Coal or Coke. Full and Half-Depth Regenerative Furnaces for Benches of 6's, 7's, 8's or 9's erected complete.

Proprietors of the Coze System of Inclined Retorts.

Office: 901 Pine St., **St. Louis, Mo.**

ESTABLISHED IN 1845.

B. KREISCHER & SONS,

Office, 119 E. 23d St., New York.

Gas Retorts,

TILES, FIRE BRICK.

AND EVERYTHING IN THE FIRE CLAY LINE.

Adam Weber,

Proprietor,

Manhattan Fire Brick and Enameled Clay Retort Works.

Works, Weber, N. J.

Office, 633 East 15th St., New York.

Modern Recuperative Furnaces

And Standard Fire Brick and Gas Retorts.

CYRUS BORGNER.
SUCCESSOR TO BORGNER BROS.
23rd ST. ABOVE RACE PHILADA. PA. U.S.A.
FIRE BRICK AND CLAY RETORTS

Works, LOCKPORT STATION, PA.

—ESTABLISHED 1864.—

JAMES GARDNER, JR.,

Hamilton Building, Fifth Avenue, PITTSBURGH, PA. P. O. Box 373.

Successor to WILLIAM GARDNER & SON

Fire Clay Goods for Gas Works.

SOLE REPRESENTATIVE OF THE McILHENNY REGENERATIVE BENCHES FOR THE U. S.

HENRY MAURER & SON,

(ESTABLISHED 1856.)

EXCELSIOR FIRE BRICK & CLAY

RETORT WORKS

WORKS, Perth Amboy, N. J.
OFFICE, 418 to 422 East 23d St., N. Y

Clay Gas Retorts,

BENCH SETTINGS,

Fire Brick, Tiles, Etc.

GEROULD'S IMPROVED RETORT CEMENT.

A cement of great value for patching retorts, putting on mouth pieces, making up all bench-work joints, lining blast furnace and cupolas. This cement is mixed ready for use. Economical and thorough in its work. Fully warranted to stick.

PRICE LIST.

In Casks, 400 to 800 pounds, at 5 cents per pound.
In Kegs, 100 to 200 " " 6 " "
In Kegs less than 100 " " 7 " "

C. L. GEROULD & CO.,

N. 3d & Prospect Avs., Mt. Vernon, N.Y.

Western Agent, H. T. GEROULD, Centralia, Ills.

Parker-Russell Mining and Mfg. Co.,

CITY OFFICE,
417 Pine Street, St. Louis, Mo.

PROPRIETORS OF THE

OAKHILL GAS RETORT & FIRE BRICK W'KS

Our immense establishment is now employed almost entirely in the manufacture of

Materials for Gas Companies

We have studied and perfected three important points. Our retorts are made to stand changes of temperature, the strongest heats of the furnace, and the abrasion of feeding and emptying. We construct

Half and Full Depth Benches of Our Own Design,

Containing 6, 8 or 9 Retorts.

We have Greatly Improved our Recuperators. Coal or Coke can be used as Fuel in Furnaces.

THEO. J. SMITH, Prest. J. A. TAYLOR, Sec'y
A. LAMBLA, Vice-Prest. and Supt.

BALTIMORE RETORT & FIRE BRICK CO.

MANUFACTORY AT

LOCUST POINT BALTIMORE MD.

Clay Retorts, Blocks & Tiles

FIRE BRICK, FIRE CLAY,
AND FIRE CEMENT.

Red and Buff Ornamental Tiles and Chimney Tops. Baker Oven Tiles 12x12x2 and 10x10x2.

WALDO BROS., 102 MILK ST., BOSTON, MASS.

Sole Agents for New England States.

PRACTICAL PHOTOMETRY.

A Guide to the Study of the Measurement of Light.

By WILLIAM JOSEPH DIBDIN.

With Numerous Illustrations Price, $3.00 A. M. CALLENDER & CO 32 Pine Street, N. Y. City

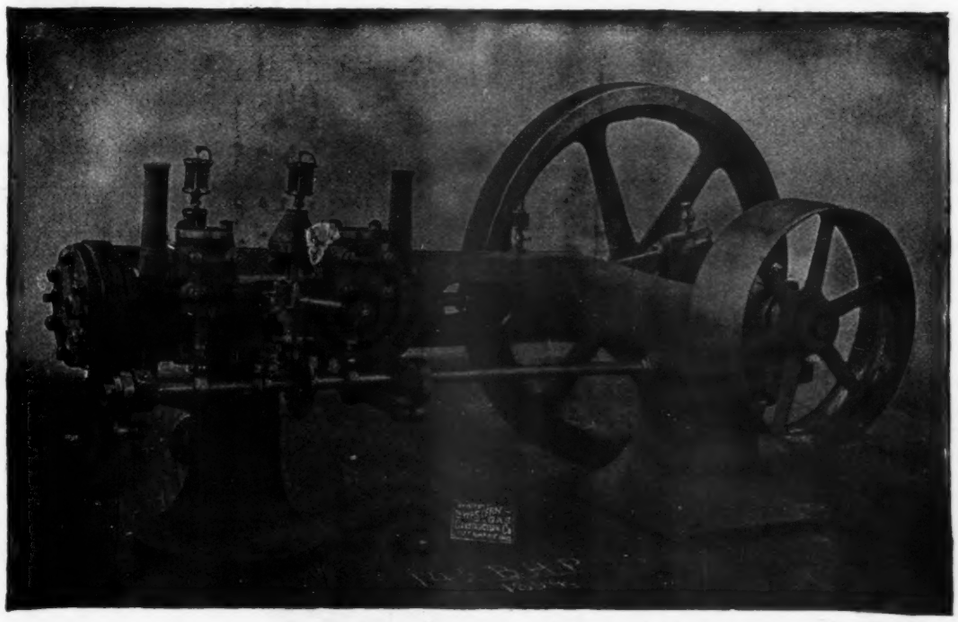
WM. W. GOODWIN, Prest. O. N. GULDLIN, V.-Prest. & Treas. H. B. GOODWIN, Sec. ERNEST F. LLOYD, Asst. Sec

THE AMERICAN GAS ENGINE CO.,

MANUFACTURERS OF

The Double-Acting Gas Engine,

Under the Patents of Griffin, and Dick, Kerr & Co., of London and Kilmarnock.



Single Cylinder.

Impulse Every Revolution.

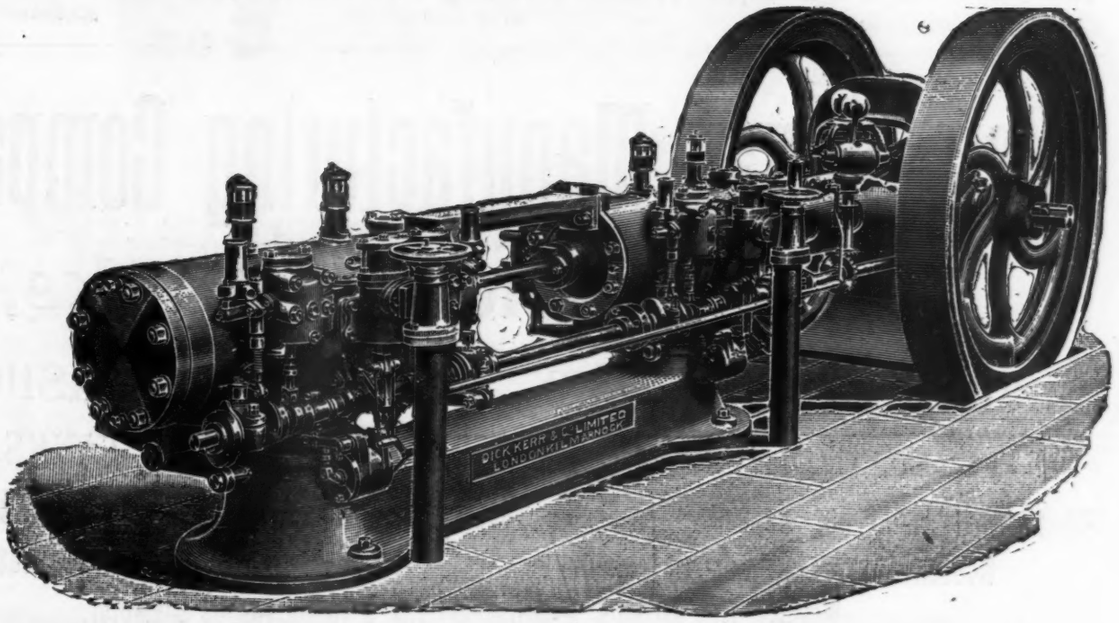
(Two Strokes.)

15 to 500 Horse Power

For General Work and Isolated Electric Plants.

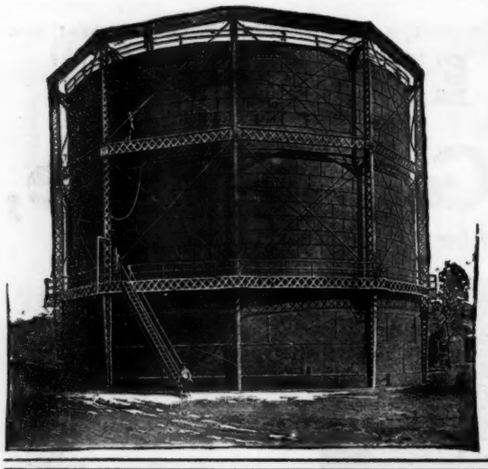
Tandem Cylinder. Impulse Every Stroke 100 to 1,000 Horse Power.

For Central Stations and all work requiring extreme steadiness.



ESSENTIAL PRINCIPLE.—An impulse at each end of piston; using half force to each impulse; doubling the steadiness; reducing the wear on moving parts, and weight for given power. **CONSTRUCTION.**—The piston rod works through stuffing box in front end of cylinder, and connecting rod is carried in a cross-head working in a slide in frame, as in ordinary steam engine practice. All valves are of the poppet type, operated by cams on a single cam-shaft, giving positive movement to every working part. Tube or electric ignition. **RESULT.**—An engine of extreme simplicity and steadiness of action, the even wear on the cylinder and all working parts assuring increased economy, long life, and minimum cost in repairs. **RECORD.**—Successful and constant use in Great Britain for the past eight years. Address

W. W. GOODWIN, President, 532 Bourse Building, Philadelphia Pa. or
THE WESTERN GAS CONSTRUCTION CO. Bldrs. & Gen. Agts. Fort Wayne Ind.



DAVIS & FARNUM MFG. CO.,

WALTHAM, MASS.

Principal Office & Works, Waltham, Mass. Boston Office, R'm 18, Vulcan Bldg., 8 Oliver St.

Single, Double and Triple-Lift Gasholders of any Capacity. Tubular, Pipe and Sinuous Friction Condensers of all Sizes.

Steel Tanks for Gasholders, Iron Roof Frames and Floors, Purifying Boxes, Center Seal or Valve Connections, Bench Work, Reversible Lime Trays.

Self-Sealing and Pressed Steel Mouthpiece Lids.

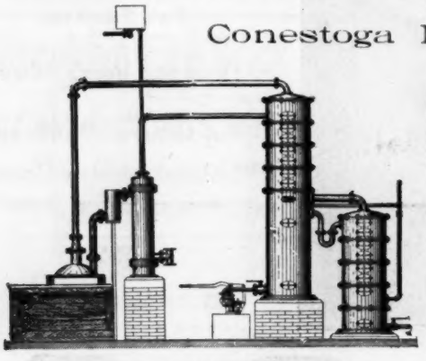
Coke Borrows, Coal Wagons, and all Apparatus Requisite for a Complete Gas Works.

Also, Gas and Water Pipe, Flanged Pipe, Sugar House Work, and Special Castings of all Descriptions.

GAS ENGINEERING COMPANY.

INCORPORATED,

Conestoga Building, PITTSBURGH, PA.



AMMONIA MACHINE.

MANUFACTURERS OF

Gas Works Machinery of all kinds,

PATENTEES AND OWNERS OF

PITTSBURGH WASHER-SCRUBBER,

SOLE AGENTS FOR

FELDMANN AMMONIA MACHINE,

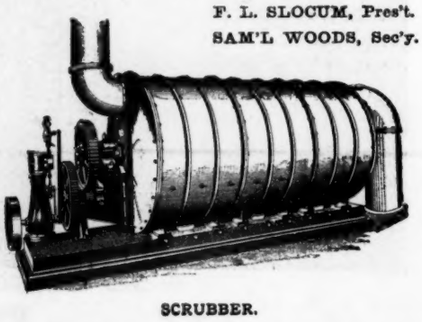
For producing Sulphate, Aqua, Chloride and Concentrated Liquors.

The Erection of Bi-Product Coke Ovens a Specialty.

Faux System of Recuperative Benches.

NEW SYSTEM HYDRAULICS.

F. L. SLOCUM, Pres't.
SAM'L WOODS, Sec'y.



SCRUBBER.

Kerr Murray Manufacturing Company,

Steel Gasholder Tanks,

SINGLE, DOUBLE AND TRIPLE-LIFT GASHOLDERS,

HORIZONTAL AND VERTICAL STORAGE OIL TANKS

Iron Work for Coal Gas Benches, Self-Sealing Mouthpieces, Exhausters, Condensers, Scrubbers, Purifiers, Wooden Trays, Floor Carriages, Center Seal and Valve System Connections, Cast and Wrought Iron Fittings, and Connections 3 to 36 Inches Diameter.

VALVES, Double Gate, Hub and Flange, Outside Screw and Quick Opening, 3 to 36 In. Diam.

COAL AND COKE WAGONS, RETORT HOUSE TOOLS, STREET MAIN SPECIALS AND DRIPS.

Address.

KERR MURRAY MANUFACTURING CO.

Fort Wayne, Indiana.

BARTLETT, HAYWARD & CO.

BALTIMORE, MD.

Triple, Double & Single-Lift

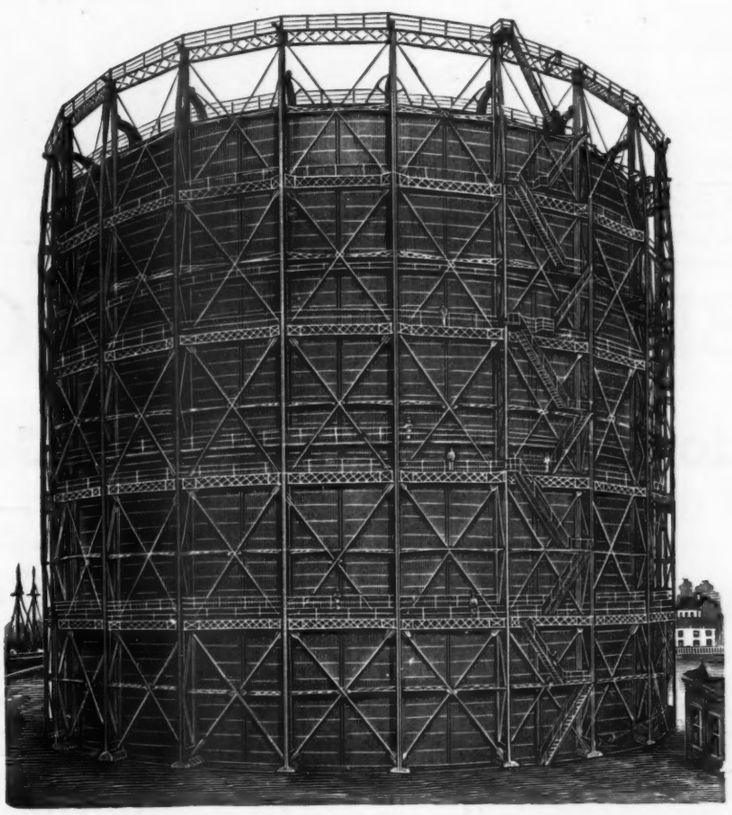
GASHOLDERS.

Iron Holder Tanks.

ROOF FRAMES.

Girders.

BEAMS



PURIFIERS.

CONDENSERS.

Scrubbers.

Bench Castings.

OIL STORAGE TANKS

Boilers.

Three Four-Lift Gasholders, each of 4,289,500 Cubic Feet Capacity, Erected in Chicago.

The Wilkinson Water Gas Process.

THIRTY-CANDLE, NON-CONDENSABLE, FIXED GAS. THE MOST SUCCESSFUL GAS PROCESS IN OPERATION.

MILL'S REVERSIBLE LIME TRAYS.

Gas Works Designed and Constructed.

PRACTICAL HANDBOOK ON

GAS ENGINES

With Instructions for Care and Working of the Same.

By G. LIECKFELD, C.E.

Translated with Permission of the author by GEO. M. RICHMOND, M.E

Price, $1.00.

A. M. CALLENDER & CO., 32 Pine Street, New York.

R. D. WOOD & CO.,

ENGINEERS, IRON FOUNDERS, MACHINISTS.

400 Chestnut Street, Philadelphia, Pa.

MANUFACTURERS OF

CAST IRON PIPE.

BUILDERS OF

Gas Holders,

Single, Double and Triple Lifts, with or without Wrought Iron or Steel Tanks.

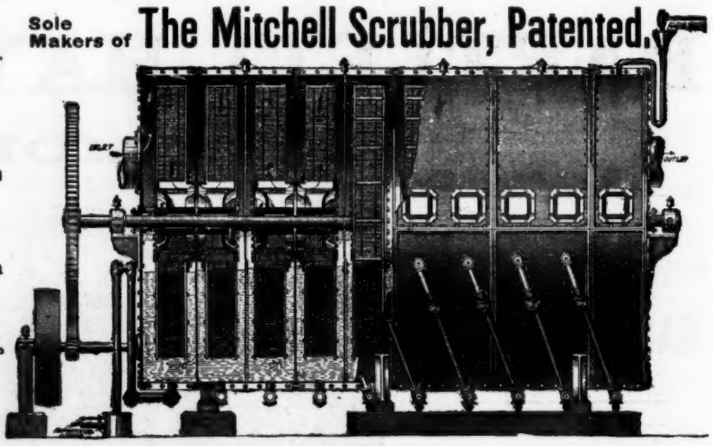
PURIFIERS, CONDENSERS, SCRUBBERS.

The Hopper Automatic Gas Governor

Send for Pamphlet.

Dunham Patent Specials.

Sole Makers of **The Mitchell Scrubber, Patented.**



ISBELL-PORTER CO.,

ENGINEERS AND CONTRACTORS FOR THE

Construction and Extension of Gas Works.

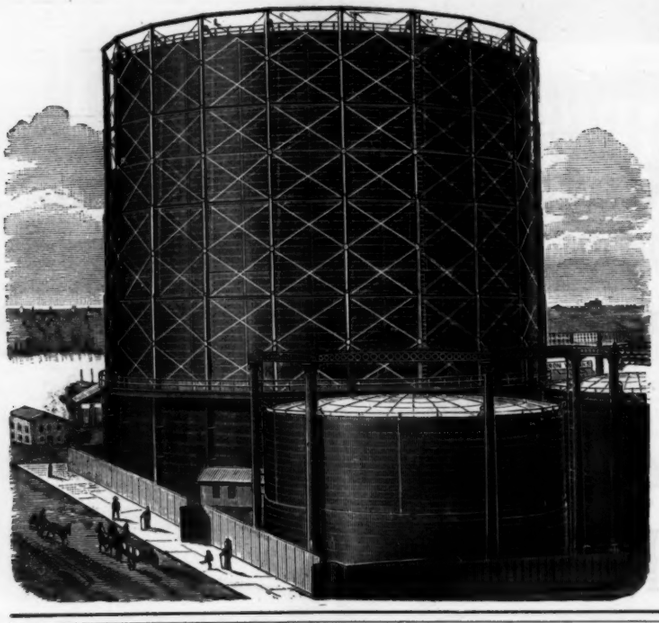
FOUNDERS AND MACHINISTS.

MANUFACTURERS OF

All Ironwork and Machinery Required in a Gas Plant.

Estimates, Drawings and Specifications furnished for the Alteration, Improvement, or Extension of Existing Works or the Construction of New Works.

245 Broadway, New York City. OFFICES **Bridge & Ogden Sts., Newark, N. J.**



The Continental Iron Works,

THOMAS F. ROWLAND, President.
WARREN E. HILL and CHAS. H. CORBETT, Vice-Presidents.
THOMAS F. ROWLAND, Jr., Secretary & Treasurer.

BROOKLYN, N. Y.

TAKE EAST TENTH OR TWENTY-THIRD STREET FERRIES FROM N. Y. TO GREENPOINT.

BUILDERS OF

Gas Holders.

Single and Multiple Section Gas Holders a Specialty.

Wrought Iron Gas Holder Tanks.

BENCH CASTINGS, RETORT LIDS.

Hydraulic Mains, Condensers, Scrubbers Purifiers, Valves, Etc.

Self-Sealing Retort Mouthpieces & Lids

For Round, Oval, or "D" Retorts.

ILLUMINATING GAS! FUEL GAS!

THE LOOMIS PROCESS.

Now in successful operation at Works of John Russell Cutlery Co., Turner's Falls, Mass., and Henry Disston's Son's Saw Works, Tacony, Pa.

The Cheapest Gas Generating System in the World.

Plans and Estimates Furnished.

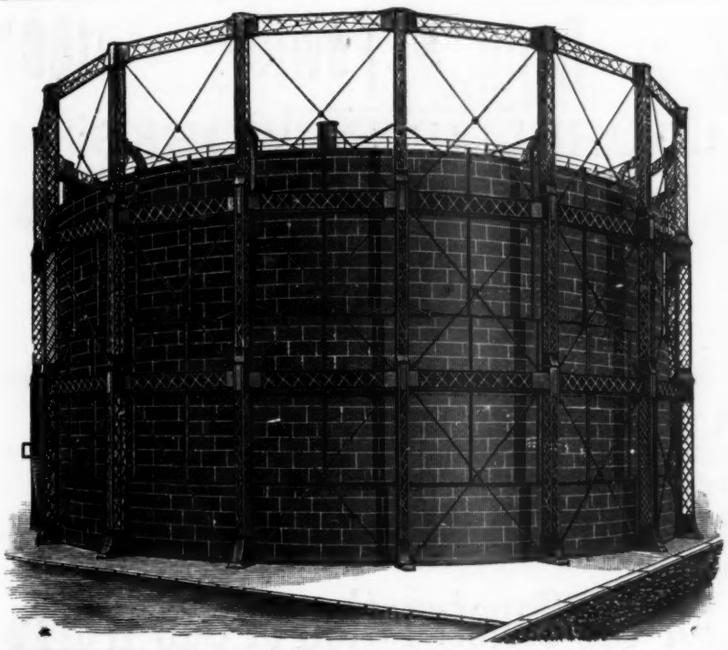
BURDETT LOOMIS, - - Hartford, Conn.

To Gas Companies.

We make to order **CAP BURNERS** to burn any amount under a stated pressure. Send for samples.

Also, SERVICE CLEANERS, DRIP PUMPS, and STREET MAIN PROVING APPARATUS.

C. A. GEFRORER,
948 N. 8th St., Phila., Pa



H. RANSHAW, Prest. & Mangr. T. H. BIRCH, Asst. Mangr
WILLIAM STACEY, Vice-Prest. R. J. TARVIN, Sec. & Treas.

THE STACEY MANUFACTURING CO

Established 1851.

Single, Double and Triple-Lift

GASHOLDERS,

Of any Capacity, with or without Wrought Iron or Steel Tanks.

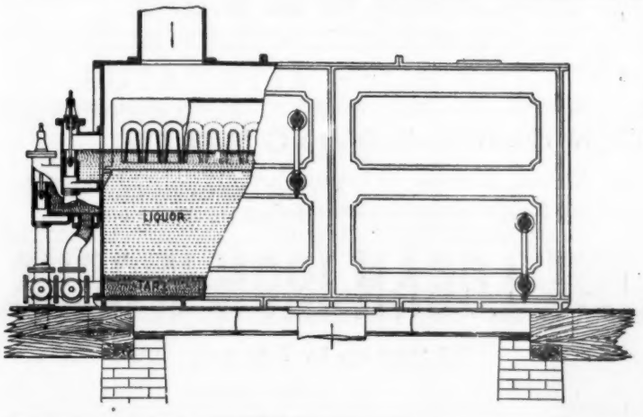
Hydraulic Mains, Condensers, Scrubbers, Purifiers, Valves, etc.

Coal Gas Benches, Roof Frames,

OIL STORAGE TANKS.

Pressed Steel Mouthpiece Lids, Self-Sealing Mouthpiece Lids.

Cincinnati, Ohio.



GEO. SHEPARD PAGE'S SONS,

SOLE AGENTS FOR THE

Walker Tar and Carbonic Acid Extractor.

During the Winter months over 12,000,000 feet of gas daily is being relieved of *all* Tar and a large percentage of Carbonic Acid by the Walker Extractor. They should be placed before all Scrubbers. The Tar and Liquor Overflow Valves work automatically. Write for Circulars.

69 Wall Street, - - New York City.

GEORGE R. ROWLAND.

Formerly with the Continental Iron Works.

Draughtsman and Constructing Engineer.

Drawings, Specifications and Estimates furnished for the construction of new works or alteration of old works. Special attention given to Patent Office drawings.

Office, No. 245 Broadway, N. Y. City.

W. H. PEARSON, Prest. J. W. WESTCOTT, Gen'l Mangr. and Treas. L. L. MERRIFIELD, Chief Engr.

THE ECONOMICAL GAS APPARATUS CONSTRUCTION COMPANY, Limited,

269 Front Street, East, Toronto, Canada.

ENGINEERS AND BUILDERS OF THE **IMPROVED LOWE WATER GAS APPARATUS.**

Designed to give the Greatest Efficiency when using any kind of Oil, Anthracite Coal, Gas House or Oven Coke.

New Gas Works Built, Present Gas Plants, either Coal or Water, Remodeled.

Catalogues, Plans and Estimates Furnished upon Application.

WM. HENRY WHITE,

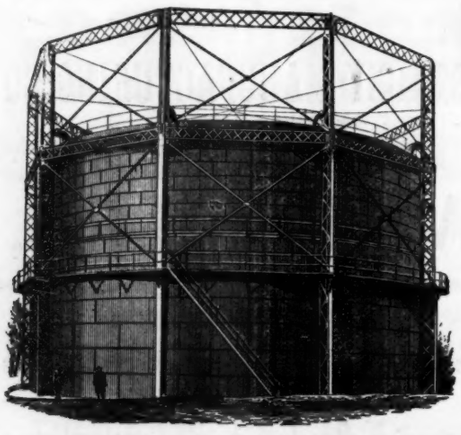
No. 32 Pine Street, - - - New York City.

ENGINEER AND CONTRACTOR FOR THE

ERECTION AND EXTENSION OF

GAS, WATER, AND ELECTRIC LIGHT WORKS.

Correspondence with Gas Companies contemplating extending or improving their Plants respectfully invited. Plans and Estimates Furnished.



1842 * Deily & Fowler, * 1897

LAUREL IRON WORKS.

Office, No. 39 Laurel Street, Philadelphia, Pa.

BUILDERS OF

Gasholders

Single or Telescopic. With or Without Iron or Steel Tanks.

OIL TANKS, WATER TANKS, AND GENERAL WROUGHT IRON WORK.

JAMES R. FLOYD & SONS,

Successors to HERRING & FLOYD,

Oregon Iron Works,

West 20th and 21st Streets, Between 10th & 11th Avenues, New York City.

Engineers and Contractors for the Construction of Gas Works.

MANUFACTURERS OF ALL KINDS OF CASTINGS AND GENERAL IRONWORK FOR GAS APPARATUS.

Bench Castings, Regenerative and Half Regenerative Furnace Castings, Condensers, Tower Scrubbers, Mechanical Scrubbers, Purifiers, Malleable Iron Retort Lids, Self-Sealing Retort Lids, Hydraulic Hoist Purifier Carriage, Crosses, Tees, Bends, Angles, Reducers, S-Bends, Sectional Sleeves, Plugs, Caps, Street Drips, etc., always on hand.

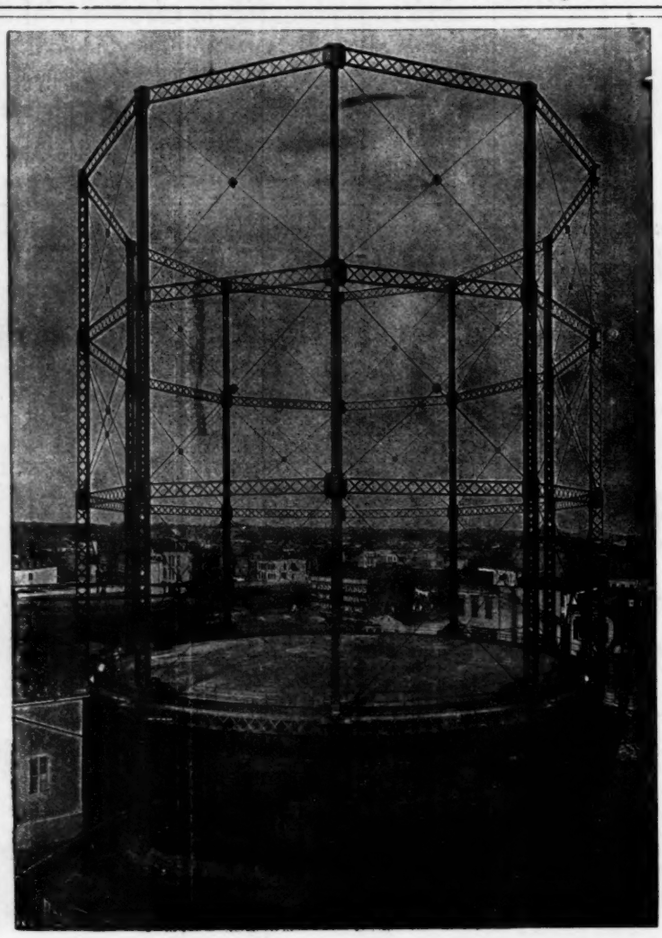
WOOD'S GAS SCRUBBING AND ENRICHING APPARATUS.

In use at Syracuse, Auburn, Watertown, Cortland and Geneva, N.Y.; Elizabeth, N. J.; Boston, Mass.; Jamaica Plain, Mass.; Providence, R. I.; Northern Liberties Gas Co., Phila.

Sole Manufacturers of the OGDEN QUICK-MOVING VALVE.

HEARNE CENTER SEAL, Operating One, Two, Three or Four Boxes.

Stroh & Osius Concentrator for Ammoniacal Liquor, used by 50 Gas Companies and Cokeries during the past 4 years.



The order for this Triple-Lift Holder and Steel Tank was received by the Logan Iron Works from the Union Gas Light Company, of East New York. The contract was completed and the Holder was in actual use in 90 days from receipt of order. Capacity of Holder, 500,000 Cu. Ft.

LOGAN IRON WORKS,

Brooklyn, N. Y.

MANUFACTURERS OF

Single or Multiple-Lift

GASHOLDERS,

Complete with Steel Tanks.

BENCHES, SCRUBBERS,

CONDENSERS,

PURIFIERS, IRON ROOFS,

Self-Sealing Retort Lids,

AND ALL PARTS OF

GAS WORKS APPARATUS

Contractors for Complete Works.

ALSO, SOLE MANUFACTURERS OF

C. W. BLODGET'S

HOT GAS SCRUBBER.

GAS AND WATER PIPES.

THE OHIO PIPE COMPANY,

MANUFACTURERS OF

Cast Iron Gas & Water Pipe,

BRANCH AND SPECIAL CASTINGS.

Gas-House Bench Castings, Hydraulics, Lamp Posts, Flange Pipe and Specials, Architectural Castings, Building Columns, Joists, Cellar Grates, Sash Weights, etc.

GENERAL FOUNDERS AND MACHINISTS

Columbus, Ohio.

DAVID LEAVITT HOUGH,

26 CORTLANDT ST., N.Y. CITY.

Consulting Engineer.

Investigations and Appraisals.
Designs and Estimates.

Contractor.

Machinery and Structures.
Gas and Water Pipe.

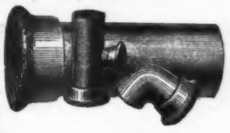
Special Agent for Selling & Purchasing.

GAS METERS.

WARREN FOUNDRY AND MACHINE CO.,

Established 1856. Works at Phillipsburgh, N. J.

New York Office, 160 Broadway.



CAST IRON WATER AND GAS PIPE,

FROM THREE TO FORTY-EIGHT INCHES DIAMETER. ALSO, ALL SIZES OF

Flange Pipe for Sugar House and Mine Work. Branches. Bends, Retorts, etc., etc

EASTERN OFFICE: NEW YORK, 192 BROADWAY. WESTERN OFFICE CHICAGO, MONADNOCK BLK

M. J. DRUMMOND

MANUFACTURER OF

CAST IRON FLANGE GAS AND WATER PIPE

AND GENERAL FOUNDRY WORK

GEORGE ORMROD, Manag. & Treas., Emaus, Pa.
JOHN DONALDSON, Prest., Betz Bldg., Phila., Pa

EMAUS PIPE FOUNDRY.

DONALDSON IRON COMPANY. EMAUS, PA

MANUFACTURERS OF

CAST IRON PIPE AND SPECIAL CASTINGS

FOR WATER AND GAS.

Also, FLANGE PIPE, LAMP POSTS, Etc.

1894 DIRECTORY 1894

OF AMERICAN GAS COMPANIES

Price, - - - - - - - - - $5.00.

A. M. CALLENDER & CO., - - No. 32 Pine Street, New York.

SCIENTIFIC BOOKS.

GAS MANUFACTURE, by William Richards. 4to., with numerous Engravings and Plates, in Cloth binding. $12.

TECHNICAL GAS ANALYSIS. $3.

GAS CONSUMER'S HANDYBOOK, by Wm. Richards, C.E. 30 cents.

PRACTICAL TREATISE ON HEAT AND VENTILATION, with Special Relation to Illuminating, Heating and Cooking by Gas. By E. E. Perkins. $1.25,

CHEMISTRY OF ILLUMINATING GAS. By Norton H. Humphrys. $2.40.

PRACTICAL TREATISE ON HEAT By Thomas Box. 2d edition. $5.

PRACTICAL PHOTOMETRY: A Guide to the Study of the Measurement of Light. By W. J. Dibdin. $3.

CHEMICAL TECHNOLOGY: Vol. I., *Fuel and Its Applications*, $5. Vol. II., *Lighting*, $4.

IRONWORK: Practical Designing of Structural Ironwork. By H. Adams. $3.50.

GAS WORKS: Their Arrangement, Construction, Plant and Machinery. $5.

PRACTICAL HANDBOOK ON GAS ENGINES, by G. Lieckfield. $1.

LIQUID FUEL FOR MECHANICAL AND INDUSTRIAL PURPOSES. By E. A. Brayley Hodgetts. $2.50.

COAL, SPONTANEOUS COMBUSTION OF. By Thomas Rowan, C.E. $2.

COAL: Its History and Use. By Prof. Thorpe. $3.50.

THE GAS WORKS OF LONDON. By Colburn. 60 cents.

HEAT A MODE OF MOTION. By John Tyndall. $—.

THE MANAGEMENT OF SMALL GAS WORKS. By C. J. R. Humphreys. $1.

MANUAL FOR GAS ENGINEERING STUDENTS. By D. Lee. 40 cents.

THEORY OF HEAT. By J. Clerk-Maxwell. $1.50.

GASFITTER'S GUIDE, by John Eldridge 40 cents.

AMMONIA AND AMMONIUM COMPOUNDS. By Dr. R. Arnold. $2

CONSTRUCTION OF GAS WORKS, by Walter Ralph Herring. $2.

DIGEST OF GAS CASES. $5.

PRACTICAL HINTS ON REGENERATOR FURNACES By M. Graham. $1.25.

DISTILLATION OF COAL TAR AND AMMONIACAL LIQUOR. By Geo. Lunge. New edition. $12.50.

A TREATISE ON THE COMPARATIVE COMMERCIAL VALUES OF GAS COALS AND CANNELS. By D. A. Graham. $3.

A TEXT BOOK OF INORGANIC CHEMISTRY. By Prof. Victor Von Richter. $2.

ILLUMINATING AND HEATING GAS. By W. Burns. $1.50

HANDBOOK FOR MECHANICAL ENGINEERS. By H. Adams. $2.50.

TREATISE ON MASONRY CONSTRUCTION. Baker. $5.

GAS ENGINEER'S LABORATORY HANDBOOK. By Jno. Hornby, F.I.C. $2.50.

GAS LIGHTING AND GAS FITTING. By W. P. Gerhard. 50 cents.

PRACTICAL PLUMBING. By P. J. Davies. $3.

GAS MANUFACTURE, THE CHEMISTRY OF, by W. J. A. Butterfield. $3.50

AMERICAN PLUMBING. By Alfred Revill. $2.

CEMENT; A Manual of Lime and Cement, their Treatmen and Use in Construction. By A. H. Heath. $2.50.

ELECTRICITY.

INDUSTRIAL PHOTOMETRY, with Special Application to Electric Lighting. By A. Palaz, Sc.D. $4.

ELEMENTS OF ELECTRIC LIGHTING, Including Electric Generation, Measurement, Storage and Distribution. By Philip Atkinson. $1.50.

ELECTRIC TRANSMISSION OF ENERGY. By G. Knapp. $3.50.

ELECTRICIAN'S POCKETBOOK. By Monroe and Jamieson. $2.50.

MAGNETISM AND ELECTRICITY. By J. Overend 40 c

DYNAMO BUILDING. By F. W. Walker. 50 cents.

DOMESTIC ELECTRICITY FOR AMATEURS. By E. Hospitalier. $2.50.

PRACTICAL MANAGEMENT OF DYNAMOS AND MOTORS. $1.

PRACTICAL GUIDE TO THE TESTING OF INSULATED WIRES AND CABLES. $1.

ELECTRIC LIGHTING, by Francis B. Crocker, E.M. $3.

ELECTRIC LIGHT FITTING. $2.

PRACTICAL ELECTRICITY. $2.50.

ELECTRICITY FOR ENGINEERS. $2.50.

ELECTRICITY, Its Theory, Sources and Applications. By John T. Sprague, M.I.E.E. $6.

The above will be forwarded upon receipt of price. If sent by mail or express, postage or express charges must be added to above prices. We take especial pains in securing and forwarding any other Works that may be desired, upon receipt of order. All remittances should be made by check, draft, or post office money order No books sent C.O.D.

A. M. CALLENDER & CO., 32 Pine Street, New York.

NATHANIEL TUFTS METER CO.,

63 Beverly Street, Boston, Mass.

MANUFACTURERS OF

DRY GAS METERS.

Station Meters of any Capacity.

Test and Experimental Meters, Pressure Registers, Pressure Gauges.

METER PROVERS, PHOTOMETERS, STREET LANTERNS, ETC., ETC.

Apparatus for the Chemical Testing of Gas and Gas Liquor.

Established 1849. With the best facilities for manufacturing, is enabled to furnish reliable work and answer orders promptly.

CHARLES E. DICKEY. JAMES B. SMALLWOOD. CHARLES H. DICKEY.

THE MARYLAND METER AND MANUFACTURING CO.

Established 1866.

BALTIMORE, North & Saratoga Sts. **CHICAGO, 107 West Monroe St.**
NEW YORK, 838 Broadway. **SAN FRANCISCO, 221 Front St.**
BOSTON, 92 Water Street, Rooms 21 and 22.

CONSUMERS' & STATION METERS, PRESSURE GAUGES, Etc., Etc.

"Perfect" Gas Stoves

METRIC METAL COMPANY,

MAKERS OF

GAS METERS for NATURAL and ARTIFICIAL GAS.

Special Attention given to Repairing METERS of all Makes.

FACTORY AT ERIE, PA.

SUPERLATIVES COME NATURAL

to the Advertiser—but when we say

The Keystone Meter is Best

in service, construction, appearance, and longest lasting, smoothest running, most accurate and "cheapest in the end" as well as at the beginning, we are only repeating the lesson some of our enthusiastic patrons have taught us.

YOU try them!

KEYSTONE METER CO., ROYERSFORD, PA.

BARTLETT LAMP MFG. CO., 66 W. Broadway, N. Y. City. Agents for New York, New Jersey and Connecticut.

WIESTER & CO., 17 & 19 New Montgomery St., S. Francisco. Pacific Agents.

GAS METERS. GAS METERS. GAS METERS.

THE AMERICAN METER CO.

Established 1834. Incorporated 1863.

WET AND DRY GAS METERS. PRESSURE REGISTERS. METER PROVERS.
STATION METERS. PRESSURE & VACUUM REGISTERS. PORTABLE TEST METERS.
EXHAUSTER GOVERNORS. PRESSURE & VACUUM GAUGES. EXPERIMENTAL METERS.
DRY CENTER VALVES. CRESSON GAS REGULATORS. AMMONIA TEST METERS.
GOVERNORS FOR GAS WORKS. MARSLAND WATER METERS. BAR & JET PHOTOMETERS.

Manufactories:
512 West 22d St., N. Y.
Arch & 22d Sts., Phila.

GAS STOVES.
SUGG'S "STANDARD" ARGAND BURNERS,
SUGG'S ILLUMINATING POWER METER,
Wet Meters with Lizar's "Invariable Measuring" Drum.

Agencies:
125 & 127 S. Clinton Street, Chicago.
810 North Second Street, St. Louis.
222 Sutter Street, San Francisco.

HELME & McILHENNY,

Established 1848. **1339 to 1349 Cherry Street, Philadelphia, Pa.**

MANUFACTURERS OF

Wet and Dry Gas Meters, Station Meters, Provers, Gauges, Etc.

METERS REPAIRED

PREPAYMENT GAS METERS.

Our Own Patents. Strong. Simple. PROMPT ATTENTION. CORRESPONDENCE SOLICITED.

D. McDONALD & CO.,

Established 1854.

511 West 21st Street, NEW YORK CITY.
51, 53 & 55 Lancaster St., ALBANY, N. Y.
34 & 36 W. Monroe St., CHICAGO, ILL.

MANUFACTURERS OF

Wet and Dry Gas Meters

STATION METERS, EXPERIMENTAL METERS, METER PROVERS, PRESSURE & VACUUM REGISTERS & PRESSURE GAUGES.

Meters of all makers Thoroughly Repaired.

THEODORE D. BUHL, President. CHARLES H. JACOBS, Vice-President and Managing Director

BUHL STAMPING CO. TRADE MARK RELIABLE GAS METERS DETROIT, MICH. U.S.A.

Buhl Stamping Company,

MANUFACTURERS OF GAS METERS,

Meter Repairing a Specialty.

Third, Fourth, Congress and Larned Streets, - - - - DETROIT, MICH.

We claim Superiority in Construction and unequaled facilities for making prompt deliveries to all parts of the country. *Mail and Telegraph Orders Solicited.*

THE ONLY METER FACTORY IN THE WORLD WHICH MANUFACTURES ITS OWN TIN PLATE.

The Advertisement of the

OTTO GAS ENGINE WORKS,

33d and Walnut Streets, Philadelphia,

New York, 18 Vesey St. Boston, 19 Pearl St., Chicago, 245 Lake St.,

Occupies this space every alternate week.

JOHN J. GRIFFIN & CO.,

1513-1515-1517-1519-1521 Race Street, Philadelphia.

52 Dey Street, New York. WM. S. GRIBBEL, Manager.

75 N. Clinton St., Chicago. FREDERICK WAUGH, Manager.

MANUFACTURERS OF

STATION METERS, CONSUMERS' METERS,

Provers, Registers, Gauges, Experimental Apparatus, Etc.

Prompt Attention Given to All Repairing.

OUR SPECIAL NATURAL GAS METER

Is the Best ever offered. Over 30,000 now in use.

We manufacture in the United States, under the **SAWER & PURVES PATENTS,** the

Positive Prepayment Meter.

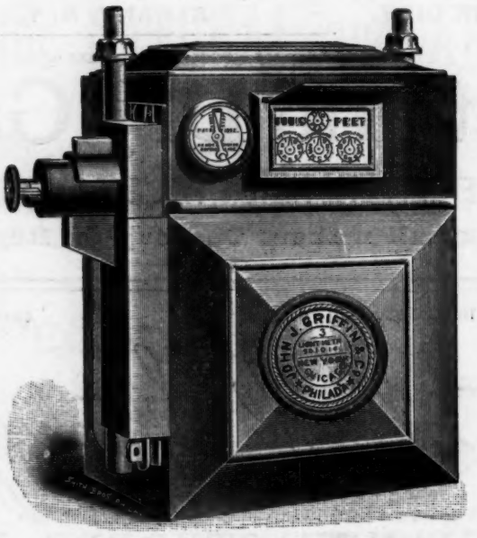
. . SIMPLE . .

. DURABLE .

. ACCURATE .

. RELIABLE .

All Parts Interchangeable



This Meter is an unqualified success in Great Britain. Its simplicity of construction, and the positive character of the service performed by it, have given it pre-eminence.

Needs Only the Care Given an Ordinary Meter.

Saves MONEY, TIME and CONSUMERS.

Dispenses with "DEPOSITS" and Increases OUTPUT.